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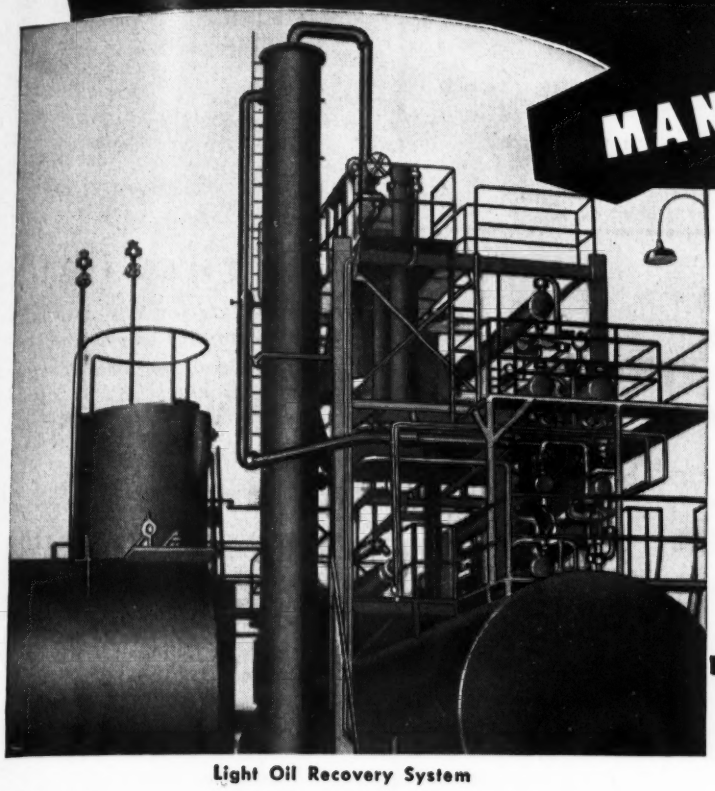
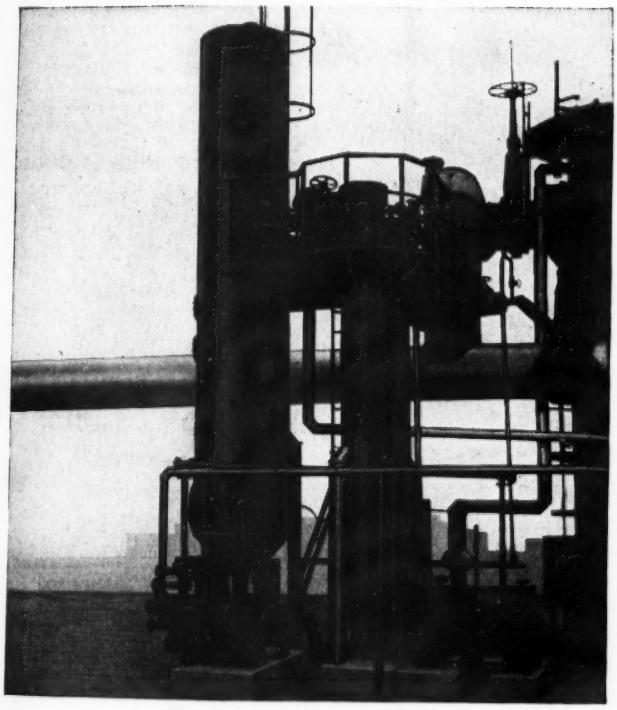
we suggest Light Oil Recovery



Light Oil Recovery System



Tar Dehydration Apparatus

The Gas Utility Executive today knows about the cost increases for raw materials going into manufactured gas. But has he explored the markets for light oils and other by-products?

Mounting demands for synthetics, and chemical products generally, have placed a premium on the value of benzol and light oils.

A study of your situation might show:

A. That by-product values will reduce your net gas cost to a lower figure than was ever before possible.

B. That peak shaving gas can be made from oil at a net cost comparable to prevalent commodity and demand charges for natural gas.

The Gas Machinery Company offers equipment for efficient Gas Scrubbing with apparatus for Recovery of valuable Light Oils. Every consideration is given heat exchange, automatic control, safety, continuity of operation and other prime factors.

May we make one more suggestion — let us also install modern equipment for Tar Dehydration and Tar Handling. Tar values are increasing too.

Consult us first. We'll give you prompt and competent assistance in your planning.

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Gas Plant Equipment and Industrial Furnaces

THE GAS MACHINERY CO. (Canada) Ltd.
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GAS

• *28th Year of Publication*

JULY 1952 • VOLUME XXVIII • NUMBER 7

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Mark Harrison and associates at Greenpoint works watch as final load of quenched coke is dumped, marking end of 23 years of service for Brooklyn's ovens (pp. 31-2).

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GAS is published monthly by Jenkins Publications, Inc., 198 South Alvarado Street, Los Angeles 4, California. Subscription price, United States and possessions (in advance), 50 cents per copy; one year, $2.00; two years, $3.00. All other countries: one year, $4.00; two years, $7.00. Acceptance under Section 34.64 P. L. & R. authorized. Member: The Controlled Circulation Audit, Inc.; National Business Publications, Inc. GAS is indexed regularly by Engineering Index Inc. Publishers: BUTANE-PROPANE NEWS; Handbook BUTANE-PROPANE GASES; BOTTLED GAS MANUAL; WESTERN METALS. The name "GAS" is registered, U. S. Patent Office.

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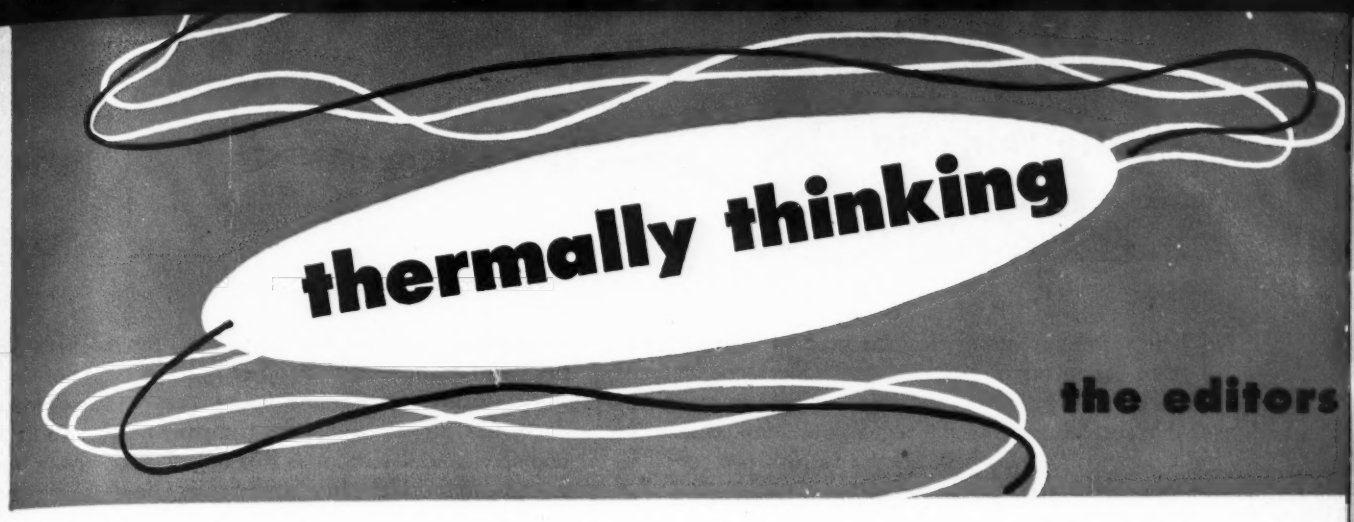


Eastern Canada Pushes for Export-Import

Washington

RUMORS here are that the Canadian Government is becoming more anxious than ever for a two-way natural gas exchange pact with the United States.

Heretofore, the extremely cautious attitude of Alberta officials in allowing gas exports to many western U. S. states has blocked the efforts of Ontario and Quebec, far to the east, to obtain U. S. gas.

It is a fact that Ontario and Quebec—the two biggest possible Canadian markets for natural gas—are closer to Texas than to the gas fields of Alberta, presently the only gas-rich Canadian province. Dominion government officials at Ottawa are said to be getting hot over the idea of a two-way agreement to assure a continuous supply of natural gas moving into Canada from the U. S. and another supply moving out of western Canada into the U. S.

Federal Power Commission officials, chafing at the bit to get into this picture, which now contains only diplomats, seem to want to use more realism in protecting the interests of the U. S. consumers than our diplomats have in recent years. FPC officials say they would want written guarantees that Alberta would revoke its policy of keeping gas for home consumption over export markets, even on a priority basis.

Obviously the commissioners have not been schooled in the finer points of how to sell the U. S. short by Secretary of State Dean Acheson and his crew. But unless the agreement is put off until next year, when perhaps we'll have some new diplomats, you can bet your shirt that Uncle Sam will get the worst end of any deal made on natural gas—or anything else—with *any* foreign government.

OPS Intervenors Get Slapped

Washington

THE OFFICE of Price Stabilization, now likely safely in business for at least another eight months since Congress renewed the Defense Production Act, has been slapped twice in recent weeks for its unwarranted activity in utility rate cases.

The report of a Senate subcommittee of the Committee on Appropriations, of which Sen. Dennis Chavez (D.-N. M.) was chairman, was highly critical of utility rate activity by OPS employees. It pointed out that from many sources the attention of senators had been drawn to the fact that OPS staff personnel is delving into utility rate cases which do not involve wholesale service, despite the express provision of the statute which limits OPS notice and intervention to utility rate cases involving utility services for "resale" to the public. The Chavez report emphasized that it was never the intent of Congress that the OPS use any of its authority or funds for such rate case intervention.

It has been reported here from Connecticut that Eugene S. Loughlin, chairman of the state regulatory commission, had refused to allow an OPS representative to appear in a utility rate case and had told OPS to "mind its own business." Loughlin said that the only thing the OPS possibly could contribute to the hearing was a general statement about inflation, of which the commission already is aware and to which it, like OPS and everybody else, is opposed.

The Connecticut regulatory chairman didn't say so, but if there is anybody in the U. S. who is not opposed to inflation, he has made himself very scarce in recent years. Everybody is opposed to bad weather, for that matter.

Chapman Upheld on Regulation of Power Lines

Washington

WHILE a decision is awaited on the Department of Interior's appeal of the Federal District Court case under which El Paso Natural Gas Co. was authorized to continue construction on its San Juan Basin-to-California line, another development seemed to strengthen the hand of Secretary of the Interior Oscar L. Chapman in his contentions about setting rules for utilities that cross federal lands.

A regulation requiring power companies who build lines across public lands to permit federal agencies to use excess capacity in such lines for transmitting federal power has been declared valid by Judge Walter M. Bastian of the U. S. District Court for the District of Columbia. Judge Bastian, incidentally, is the same judge who had ruled in favor of El Paso in the case against Interior on the pipeline issue, but he had failed to say whether Interior or FPC should set the rules for El Paso's crossing.

In his Idaho Power Co.-versus-Chapman decision, Judge Bastian stated:

"The provision authorizing the head of a department to grant easements or rights-of-way under general regulations to be fixed by him includes the right to make reasonable regulations, and the regulations adopted seem to the Court to be reasonable and to furnish protection to the plaintiff."

Marion Clawson, director of the Bureau of Land Management in the Department of the Interior, pointed out that this decision may be far-reaching, since the Secretary of the Interior's authority to make regulations necessary for carrying out his public responsibilities has been questioned in connection with other types of rights-of-way.

As a matter of fact, El Paso has been trying to make a deal with Interior so that the company may finish its line and service new customers this fall. The company wants to agree to finish the line, under rules laid down by Chapman, but with the stipulation that if the higher courts later rule in its favor it no longer will have to obey Interior's rules, and most particularly not the one which requires it to serve as a common carrier.

Exclusive Agreements Question Still Unanswered

Washington

THE U. S. SUPREME COURT has ruled in the Pennsylvania Water & Power case (mentioned in these columns more than a year ago) that the FPC does have authority to fix interstate utility rates based on exchange agreements, but the majority decision still leaves unsettled the intriguing question of whether utilities actually violate antitrust statutes when they make exclusive agreements covering supply and demand.

In the dissenting opinion, however, Justices Douglas and Reed made it appear that they believe utilities cannot get together on exclusive supply agreements without violating antitrust laws, even though the final arrangement is ordered and approved by virtue of the regulatory authority of the FPC under the Federal Power Act.

This hints that commission regulation *per se* does not supersede a governmental policy of enforcing competition through antitrust laws. In parallel situations involving state legislation, it has been held that the creation of regulatory commissions automatically abrogates a previous government policy of enforced competition insofar as utilities are concerned.

Since wholesale and retail gas companies make many such exclusive agreements, it seems possible that this will be a thorn in the legal flesh in future years, unless, by some other means, the Supreme Court clarifies the entire picture. It's a novel point—and yet one that seems to make the lawyers in the bureaus very happy.

"Clean Up Those Press Releases"

ABOUT THE TIME we were coming off the press last month with a story patting Lone Star Gas Co. on the back for its smart press relations, the Dallas utility was striking out in a new direction and obligingly providing us with a postscript. A particularly pertinent one, moreover, because in June this department made the remark that the hesitancy to fight back against false claims in electrical appliance merchandising and advertising was proving damaging to gas utilities; and it was just this situation that Advertising Manager L. C. Roberts of Lone Star was taking steps to rectify.

Fed up with the phony claims and innuendoes he had spotted in newspaper accounts of electric cookery, Mr. Roberts ran off some photostats of a particularly outrageous news item and circulated it to newspaper editors throughout the Lone Star territory with a covering letter pointing out the many misstatements of fact. "The story is full of inaccurate claims and statements," his letter read. "Since no one is quoted as making the claims or statements, the newspapers which ran the story made them.

"Because such stories are aimed directly at our business, I should like, if I may, to point out to you some of the misstatements of facts and inaccuracies."

In addition to the letter of refutation, Mr. Roberts enclosed a copy of the now-famous statement from Vick Clesi, Dallas restaurant operator, disproving shrinkage claims based on "tests" made at his restaurant.

It didn't take long for the letter to bring action. Several editors wrote or called to assure Lone Star that they had never to their knowledge published statements of the sort, but would now be alerted to prevent such an occurrence in the future.

The editor of a large central Texas newspaper which actually used the release had this to say:

"I am in sympathy with the position taken in your letter. . . . As for what others may say about themselves, and the claims they make, it is difficult for us to police the area, but when we carry such information without crediting the sources, our faces are obviously red.

"Steps have been taken to avoid any such confusion in the future."

* * * *

SPEAKING OF PUBLIC RELATIONS, as we do so often because it has been uppermost in the minds of many in the industry for a long time and should be kept there, there's another important PR story in this issue (p. 33). Southern Cal's program is already proving effective, and it should be emulated. It—and many other companies—are taking positive action, and future issues will explore some of these activities in a sort of continuing case study. It is hoped that other utilities will adapt at least a few of them for incorporation in their own programs. Those, that is, that have programs.

technical trends

by guy corfield

What Next In Plastic Pipe?

THE APRIL 1952 issue of *GAS*, containing an article on "Seven Years Experience with Plastic Services" and a national survey of the gas industry indicating that "six companies are using it (plastic pipe) and many others plan to give it a try," together with seven advertising spreads announcing the availability of as many different brands of plastic pipe or tubing, makes it appear rather definitely that "plastic" underground piping for gas distribution, and ultimately even transmission, is beyond the initial experimental stage and awaits only active development to become a major structural and operating material. The word "plastic" has been put in quotes to stress that the material it defines is still new and indefinite in concept and composition, generally referring to the apparently almost infinite group of non-metallic substances popularly understood to be derived largely from such plentiful and simple raw materials as corn cobs, air and water, through modern chemical alchemy, and appearing every day in new colors, shapes, sizes, and adaptations in industrial and consumer goods.

The possibilities and potentialities of constantly available and non-corrodible plastic piping for the gas industry seem to be so great and so promising as to make it imperative that they be explored actively and widely. So far investigation has been confined to relatively few types, and practical use to apparently only one (Tenite II, cellulose acetate butyrate); and beyond the 12 companies which have used it or have early plans to do so, the interest has been somewhat passive. This would seem to be a situation where basic association research is indicated, together with field trials to cover the various promising plastic formulae in types of soil and types of gas, climates, and operating conditions that obtain throughout the country. At the same time, to avoid possible unfortunate experiences that might be detrimental to such development, there should be some caution in the acceptance and widespread use of any new type or formula of plastic tubing that may be advocated, until it has been given reasonable appraisal and experimental trial.

Let us now take a quick glance at the present situation and future possibilities. Tenite II tubing, as described in the articles referred to earlier, has been a generally satisfactory material in service, with both disadvantages and advantages as compared to metal pipe. Its installed cost is about the same as that of coated steel, or copper. It is not as strong as metal, becomes somewhat soft at elevated temperatures, will burn slowly, and is susceptible to aromatic hydrocarbons such as manufactured gas "drips"; however, it is not subject to soil corrosion or electrolysis, does not require coating, is an electric insulator, is light and easy to handle, and joints are readily and easily made. It seems very encouraging that the first major trial of a plastic material, that was *adopted rather than developed* for underground piping use, indicates that it can hold its own with conventional metal pipe; and it appears rather certain that deliberate research and development can result in early and significant improvement.

When the various plastic developments are reviewed, it seems that one or more of all of the desirable properties can be produced, and it may not be impossible to combine them into the perfect material; and, if this can be done with respect to basic physical and chemical properties, the equally important elements of cost, availability, and usability can probably be worked out. For instance, General Electric is now announcing rubber-phenolic plastics which have unusual shock strength and resistance to strong detergents; and the property of silicone greases in retaining their consistency at both high and low temperatures has now been imparted to silicone rubber, which in addition has complete resistance to oil, and silicone resins are now appearing which presumably will exhibit these same properties of temperature, stability, and hydrocarbon liquid resistance.

Again, there is a large group of reinforced polyester, phenolic and other synthetic resins, the principal reinforcement being glass fiber, which produces plastics that are as strong as steel and almost completely inert to most chemicals and solvents, weathering and rot, are good electrical insulators, and are highly resistant to heat and fire; and the American Cyanamid Co. has developed "PDL" formulae expected to find application as lightweight heat resistant airplane parts and durable ovenware for the home.

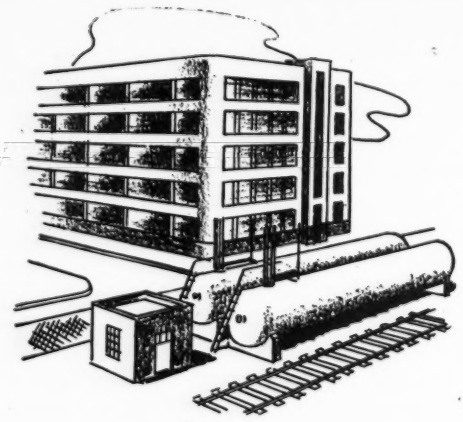
Furthermore, the navy has recently announced that, after 8-month tests, glass cloth reinforced synthetic resin pipe will be used as non-ferrous piping in mine sweepers. One article has stated that the 1952 production of synthetic resins will be 2.6 billion pounds, using in addition 14 million pounds of reinforcing glass.

In general, reinforced plastic pipe has been expensive to produce because it has of necessity been wrapped and cured on a mandrel, but recently success has been reported for an extrusion method that may reduce the fabrication cost materially.

Philgas*

THE ALL-PURPOSE FUEL

For Industries



Philgas, a clean, high-quality LP-Gas, is being used by leading industries for heat treating, mold drying, core baking, ceramic firing and many other operations. Philgas butane-propane systems are automatic, cutting down on overhead while assuring constant furnace temperatures, atmospheres, and pressures.

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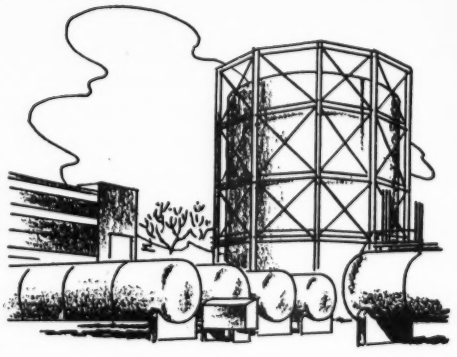

Free from harmful contaminants, Philgas is used by many progressive utilities to augment supplies of natural or manufactured gas. Cleanliness, uniformity, constant pressures (high or low) and easy automatic operation make Philgas a *superior* product. It's America's largest selling brand of LP-Gas.

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Goodbye To The Coke Ovens

After 23 years, Brooklyn Union has shut down its Greenpoint works coke oven plant. The event is described in this story reprinted from "Brooklyn Union Gas News."

Russell Shaffer (left), engineer of manufacture, and Ernest Phillips, long-time employee, watch final load of red-hot coke pushed from oven where gas is extracted from coal.

AN event not unattended by drama and nostalgia occurred on May 18 when the Brooklyn Union Gas Co.'s coke oven plant at Greenpoint Works was shut down after 23 years of continuous and efficient operation.

William E. Tate, general superintendent of Greenpoint Works, made the story of the shutdown the subject of a detailed reported at a department heads' meeting on May 20.

By far the most important and complicated phase of the plant shutdown was the actual shutdown of the ovens proper, said Mr. Tate. The work involved in shutting down a coke oven battery falls into three categories:

1. Emptying ("pushing") the ovens of coke.
2. Shutting off the gas used for underfiring.
3. Handling the gas which is produced during the coking process.

The first two are straightforward and present no problems that are not encountered in daily routine. The work of the third category does create a new set of circumstances for which elaborate plans and precautions have to be developed. These plans are two-fold:

1. At sometime during the final coking period, a decision has to be made to stop the flow of gas to plant equipment and bleed the remaining amounts into the atmosphere.

Mark Harrison (left), superintendent of Brooklyn Union's bank of 90 coke ovens, watches as final load of quenched coke is dumped into wharf where it travels by moving belt to be sorted for sale.

2. One of the fundamentals of coke oven operation is the maintenance of a slight positive pressure, + 8 mm of water column, in the collecting mains.

In normal operation when the volume of gas generated varies little from hour to hour, this positive pressure is maintained within precise limits by an automatically controlled butterfly valve in the outlet or crossover main from the battery. In shutting down a battery of ovens, the positive pressure in the collecting mains has to be maintained, but as the volumes of gas dwindle from hour to hour, other means beyond the use of the butterfly valve have to be applied.

These two conditions constituted the main problems in shutting down the ovens.

The scheduled shutdown date of May 15 was extended to use up coal on hand. It was quite a guessing game to estimate the amounts on hand each day and adjust the pushing schedule accordingly, but by Friday, the 16th, it was obvious that the last oven would be charged on the 8 to 4 shift the following day.

All preliminary preparations including the hookup of the Harrison purging machine to the inlet of the primary coolers

were completed when the last of the available coal was charged into No. 130 oven at 12:20 p.m. on Saturday. The pushing rate was 130 ovens per day which meant that if all went well, the last oven would be due for pushing around 4 a.m. Sunday.

From 12:20 p.m. on pushing operations continued on schedule. For the first two hours there was little change in volume of gas evolved, but by the third it began to decrease. About the fourth hour one of the two exhausters pulling the gas from the ovens was shut down and shortly thereafter one of the two primary coolers between the ovens and exhausters was taken off the line by closing and watersealing its outlet valve.

Continuous Gas Analysis

From 4 p.m. on, chemists were continually making gas analyses for CO_2 and O_2 content and watching calorimeters for changes in Btu. It had previously been decided that if the O_2 content went above 5%, the flow of gas to plant lines would have to be shut off and the balance bled to atmosphere; also it was expected that the Btu would gradually drop, but a sudden radical drop might indicate trouble.

Each of the four collecting mains has 2-in. steam connections at both ends and each man was equipped with accurate pressure gauges. Men were assigned to watch these gauges and instructed to turn on the steam as required to maintain a minimum pressure of +6 mm.

Operation of the exhauster was taken off automatic and put on hand control. Regulation was adjusted periodically commensurate with the volumes of gas to be pumped.

By 6:30 p.m. it was necessary to crack the steam valves to the collecting mains and from then until 11:30 p.m. operation continued in this fashion with the quantities of steam gradually increasing as the gas volumes decreased. At 11:30 p.m., when 65 of the 90 ovens had been pushed empty, when the Btu had dropped to 435, and when the O_2 content was still 0.4%, a slight but uncontrollable fluctuation began to develop in the collecting mains. Instead of a steady + 6 mm the pressure began to vary from + 3 mm to + 10 mm. This was undoubtedly due to some condensation of the large quantities of steam in the line from the collecting mains to exhausters and was aggravated by a sudden rainfall. Anyway, it was responsible for the decision to stop pumping and bleed the balance of the gas into the atmosphere.

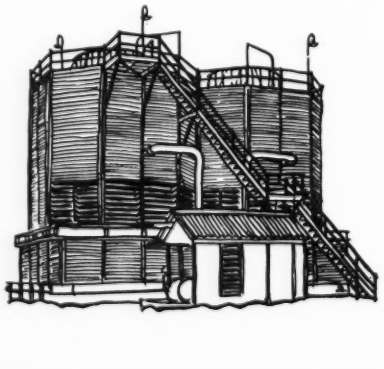
Orders were given to simultaneously shut and water seal the outlet valve of the primary cooler, start the inerts into the main, shut down the exhauster, open the bleeders on the collecting mains, and open wide the steam valves into the collecting mains. All of this was done immediately. The pressures on the collecting mains increased to from 2 in. to 4 in. and remained of that order until all the rest of the ovens were pushed and all gas had been displaced from the collecting mains.

The Unexpected Happens

At the changeover an unexpected incident did occur. It had been realized that at changeover no more coke oven gas would be available for under-firing and valves at the meter house had been arranged so that water gas would back up into the coke oven main and supply the fuel. However, a momentary surge in pressure occurred as the flow of coke oven gas stopped before the water gas backed in, and the reverse room operator, believing the flow had been interrupted, and acting properly, immediately shut the gas off at the ovens. By this time all of the under-firing line valves had been throttled and those to 30 of the heating walls had been completely shut off. Because there was so much residual heat in the oven brickwork, no attempt was made to turn the gas back on, but it was decided to push the remaining ovens out as fast as possible, before too much cooling off took place. This was also desirable from the standpoint of the collecting main condition, for it would reduce the bleeding to a minimum and would eliminate all the gas from the collecting mains as soon as possible.

The last oven was pushed out at 2:17 a.m. Sunday morning and shortly thereafter the chemists took tests and reported the collecting main clear of gas.

During the interval from changeover until the last push, the purging machine was putting inerts into the main at the inlet of the primary coolers and backing them up through the crossovers into the collecting mains, where they supplemented the steam purge. An anxious moment occurred when the steam and inerts venting at the bleeders began to pulsate. This was evidently caused by deposits in the main near the hot drains restricting the flow of the condensate. It was quickly rectified.



The ammonia circulating liquor was shut off shortly after the last push, and by 3 a.m. chemists declared the entire circuit safe from the inlet of the primary coolers back through the battery.

The primary coolers had been drained of tar and ammonia liquor and flushed out with salt water before purging started. They had to be in a safe condition before any physical disconnects could be made and would not take too long. Not so the case! Naphthalene deposits in the coolers and their downcomers were very difficult to remove even after steam was applied with the inerts. It was not until 3 p.m. on Sunday afternoon that a safe condition was obtained, following which mechanics removed sections from the crossover mains, thereby isolating the battery.

Coal Handling Stops

Coal handling operations stopped on Saturday morning when the last of the coal was run to the battery bins.

Coke handling operations will continue until disposal is made of the coke in stock.

The producer plant is still operating, supplying producer gas for water gas dilution, but will be shut down when this is no longer necessary, following a procedure used on two previous shutdowns.

The by-product apparatus is still under gas pressure, but it is expected that purging of it will be done within a few days.

In the meantime, all concentration of effort is being expended in making apparatus safe, which entails making certain selected disconnects and physical removals of piping.

During its 23-year life-span, concluded Mr. Tate, the Greenpoint Works coke oven plant has played a very important part in the operation of the company's manufacturing department. From a total of 17½ million tons of coal it has produced 13½ million tons of coke and 200 billion cu ft of gas. As a result of its shutdown, Greenpoint Works will be changed from a combination water gas-coke oven plant with L.P. gas standby with a capacity of 161 MMcf of 540 Btu gas per day to an oil gas plant with L.P. gas standby having a capacity of 85 MMcf of 1040 Btu gas per day.

B. F. MacMahon, introduced as "Mr. Inside," demonstrates physical properties of gas before a group of firemen. Some of the props used, including those used by the street department in its presentation, appear in the background.

SoCal Shows Firemen How To Handle Gas in Emergencies

LAST month, in Redondo, Calif., 40 firemen from that area gathered in the Redondo City Hall to listen to a story about natural gas. It was a story that the Southern California Gas Co. has told 40 times over the past 18 months to a total of more than 1800 fire fighters, as part of a continuing program to acquaint them with the fuel and its characteristics, and to teach them how to deal with it in cases of emergency.

Exclusive

As a result of SoCal's efforts, 1800 firemen in the service area have a better appreciation of the fuel and of the problems of those who serve it.

For Better Understanding

Some two years ago, SoCal's public relations people felt the need for a better understanding by the press, the public, and the firemen of the properties of gas and the problems connected with its use. The key people, of course, were the firemen. They were the ones to take charge in cases of emergency. Wrong actions or misstatements of fact could have damaging consequences, both in loss of life or property and in public regard for the fuel.

From this exploratory investigation grew the indoctrination program for firemen, based on the premise that both the public utility and the fire department, working for the same boss—the public—have a community of interest and responsibility in preventing losses and seeing to it that natural gas is handled wisely.

The agenda for the meetings was drawn up in such a way as to give the firemen a better understanding of the gas company's operating methods and proper procedure to follow in handling emergencies. Emphasis was placed upon that information which would be most helpful in securing cooperation between fire companies and the gas company in bringing emergencies involving gas under control in the safest and quickest manner. No promotional material, as such, was included in the program.

Four aspects of the general problem are presented in four different sections in the two-hour program. The first deals with the physical properties of natural gas, combustion, and the handling of emergency incidents inside buildings. The second explains the distribution and delivery of natural gas to the meter, and the handling of emergency incidents outside buildings.

Claims and Publicity

The third section outlines the company's activities on the settlement of claims, offering the service of SoCal's claims department specialists to fire departments in establishing pertinent facts involved in a case.

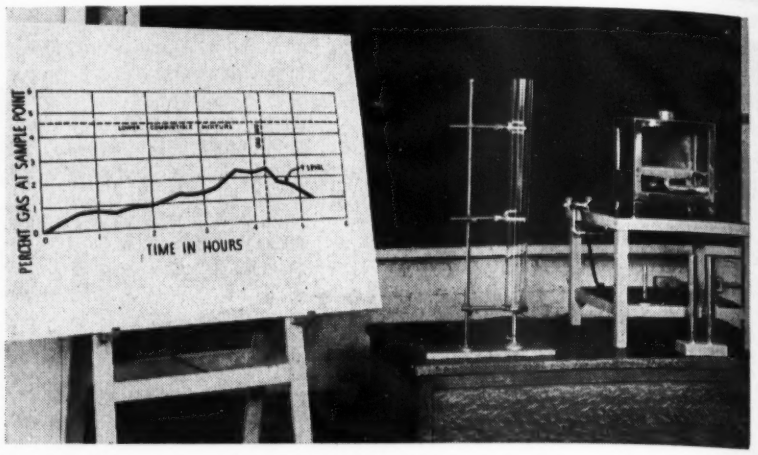
Fourth, the company's position in regard to news coverage of accidents involving gas is outlined.

Arrangements for meetings are han-

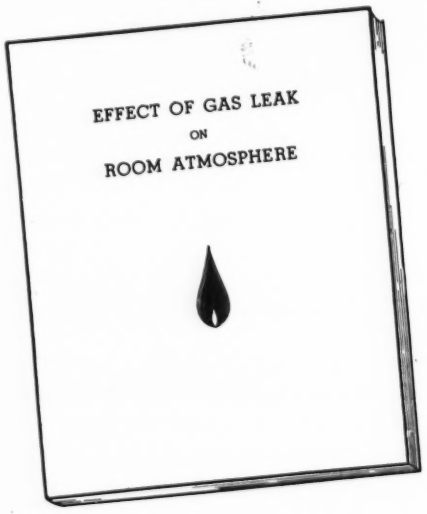
dled locally, usually through established organizations. Local gas company people call on such groups as firemen's associations, fire chiefs' associations, and fire prevention groups, and offer to present the material at a regularly scheduled meeting. After the association has seen the program, the local manager then offers to take it to individual fire departments for presentation to the entire force. This pattern has worked rather well, although in some localities contacts have been made directly with local fire companies first. In one case the training officer of the county fire department made all arrangements for scheduling the meetings in fire departments throughout the county.

Ingenious and well executed demonstrations are the factors that best put across the messages in sections one and two. Being comprehensive, and therefore rather lengthy, these portions of the program are given greater impact through the use of interesting working props.

PROPS and AIDS



Shown above are props used for first section, covering properties, combustion, and the handling of emergency incidents inside buildings. Metal box with windows demonstrates how air is needed to support combustion. Tubes illustrate lighter-than-air property, combustion characteristics.



Two booklets are distributed for future reference: the study, "Effects of Gas Leak on Room Atmosphere," at left, and "Facts About Natural Gas," a pocket-size pamphlet outlining fundamentals of gas and gas service procedures for handling emergencies.

First Section

The first section dealing with physical properties of natural gas and the handling of emergencies inside buildings, treats those points that are most often raised by fire department personnel. The talk and demonstrations offer proof that—

1. Natural gas is odorless
2. Natural gas is non-toxic, and
3. Natural gas is lighter than air.

The odorless characteristic of natural gas is discussed to point out that natural gas distributed in the territory served by the Southern California Gas Co. is odorized in such a manner that the odor is consistent in characteristic and intensity throughout the system. This point is demonstrated by putting two drops of odorant on a ball of cotton and allowing the firemen to smell the potent gas odor that comes from this amount of odorant. The non-toxic quality of natural gas is discussed to correct erroneous opinions of firemen who have had occasion to work with manufactured gas or who have read of experiences of other fire departments in handling incidents involving manufactured gas. This point is established by reference to a series of experiments conducted at the University of Southern California, involving exposure of rats, monkeys, and human beings to various concentrations of gas.

The potential hazard of natural gas—suffocation through an exclusion of oxygen—is pointed out, however, and emphasized by a demonstration using a gas-filled tube which, of course, will not support combustion.

The fact that natural gas is lighter than air is of prime importance to fire departments. On occasions, firemen who are not familiar with this characteristic of the fuel have needlessly interrupted service to customers over a wide area around a broken line when only a few meters needed to be shut off. This section of the meeting is intended to prove definitely that natural gas will rise and dissipate in the atmosphere unless it is trapped from above.

This property of natural gas is demonstrated in a graphic comparison with a heavier-than-air gas. The latter, a vaporized cleaning solvent, is placed in one metal tube with natural gas being directed into an identical tube. The vaporized solvent can only be ignited at the bottom of the tube, while natural gas will only ignite at the top.

The combustion story points out the relatively narrow range of mixtures of gas and air that will burn and demonstrates the three requirements for proper combustion of natural gas. The effects of depriving the flame of either air or kindling temperature, and the resultant incomplete combustion with possible production of carbon monoxide, is demonstrated with appropriate laboratory equipment. The volume of questions prompted by this section of the meeting indicates a great deal of interest on the part of firemen who have occasion to

give emergency treatment to victims of asphyxiation.

As a windup to this section, the information that has been covered is reviewed briefly to show how it can be applied to investigation procedures of incidents where it is suspected that gas is involved. "Cases arise where gas appliances are involved but where gas itself is not the cause of the accident," the demonstrator explains, and cites several hypothetical cases as illustrations. Where it has been conclusively established that gas is directly involved, however, he reminds them that there are three points which should be clearly established: the location of ignition, the means of ignition, and the source of the fuel—and tells them briefly how these factors might be determined.

A method of determining the exact amount of gas that was escaping into a building where an incident occurred is explained briefly by reference to a booklet titled, "Effect of Gas Leak on Room Atmosphere," which, together with a special booklet on "Facts About Natural Gas," is made available to all present.

Outside System

The second section of the meeting is started with a very brief description of the transmission and distribution system, and a discussion of possible sources of damage to the system, including corrosion, "acts of God" such as floods and earthquakes, and damage caused by construction equipment operated by the utilities and contractors. Causes of corrosion and the steps being taken to keep this source of damage under control are explained. The barring technique which is discussed and demonstrated with pictures always stimulates the audience's interest.

The infrequency of damage from so-called "acts of God" points up the fact that most cases of blowing gas in streets are due to man-made causes, particularly construction work being carried out adjacent to gas company underground structures.

Since this type of accident is most prevalent, the demonstrator dwells at some length on remedial procedures. Shutoff points that are available to firemen or gas company employees to control leakage at the break are indicated, and the normal location of individual meter valves, service riser cocks, and curb meter valves which can be operated by firemen are referred to in a series of pictures and demonstrations. Shutoff points available to gas company employees, such as those built in the service connections and valves in main lines, are enumerated. A typical isolation district is shown to demonstrate why the knowledge of what valve to close is necessary in order to control leakage at a given point in the distribution system. The point is emphasized that only authorized gas company employees should be allowed to operate main-line valves. The firemen readily appreciate the necessity of this when the possible effect of indiscriminate closing of the valves is explained.

One of the high points of the meeting is the demonstration of how a pressure control fitting or a "portable valve" can be installed by a gas company crew to control leakage at a given point in the system. This operation is carried out using regular issue tools to show how these fittings can be installed without allowing gas to escape into the atmosphere. Even though the demonstration occupies considerable time, the attention on the part of the firemen is held throughout.

The demonstration of what is involved in installing a pressure control fitting leads into the discussion of why, on occasions, the gas company seems unconcerned about allowing a leak to flow or a fire to burn at the scene of an incident. This is explained on the basis that the gas company has a dual responsibility when an incident occurs: first, to get the immediate hazard under control; second, to select a shutdown and repair procedure that will affect as few customers as possible. It is pointed out that merely shutting off main valves would simplify repair, but would ignore the responsibility to maintain service to the hundreds, or perhaps thousands, of customers who might be deprived of gas. The hardship such action might impose on hospitals, institutions, factories, and others who depend upon continued gas service, is explained. The light-up procedure followed by gas company people in reestablishing gas service is treated in some detail, and the firemen are advised to leave valves closed and let gas company employees make the necessary turn-ons rather than opening the valves themselves.

At this point in the program, the demonstrator explains the organization setup within the gas company to cope with situations of this kind—the division of the system into 26 operating districts, each with a separate operating base; the supervisory personnel, district foreman, field crews, and dispatch office; the communications system used to bring in supervisors and field crews quickly. He tells how the fire department can help in getting the gas company on the job in a hurry, with the proper type of personnel and the proper equipment, by notifying the company and giving pertinent information about the incident.

Suggestions are given for proper handling of blowing leaks, leaks in or under a building, leaks in the street; and of burning gas leaks and when they should be extinguished, when left burning.

Company men most likely to be called to the scene of an emergency are introduced to the firemen before the conclusion of this section.

While sections one and two are presented by representatives of the customer service and street departments, the last two sections are handled by the local men from scripts prepared by the claims department and the public relations departments, respectively. All material, incidentally, is carefully scripted so that timing and contents of each program will be uniform.

The problems which arise from use of excessive amounts of water at the scene of a main break are also explained, and firemen are urged not to direct streams from fire hoses directly at gas leaks. One case, in which water was introduced into a low pressure distribution system and caused inconvenience to both the gas company and the general public in that area for several months, is cited.

Claims Section

Section three, the claims department's message, is very brief. The speaker reminds the firemen that the gas accident incidence is extremely low considering the many miles of mains and the 1.3 million active meters. The desire of the gas company to assist in investigations and the need for having as much information as possible are emphasized.

"Since we are both serving the public, we are both attempting to find the cause and prevent a recurrence," the speaker points out.

Publicity Section

Section four, dealing with publicity, suggests that firemen:

1. Withhold statements from the press until they are sure of the cause of a fire or explosion.
2. Refer reporters to gas company people in cases where gas is obviously involved.
3. Help the gas company by explaining to curious spectators why the gas is not shut off immediately.

It is necessary, of course, to explain that

these requests are not an attempt on the part of the company to suppress news, but rather an attempt to cooperate with the press in seeing that they get correct information. The adverse effect of incorrect information is illustrated by citing several examples where incorrect or inaccurate news coverage caused needless public concern.

"A case in point," says the speaker, "is an occurrence in downtown Los Angeles last year. A couple of workmen by mistake removed a valve on a live main on a vault in the street. The gas blew out and caused quite a commotion before the gas company could bring it under control. There was no fire and definitely no explosion, but several papers talked about a gas 'blast,' and one of the more imaginative reporters described a wall of flame that shot into the air when the gas was released.

"This kind of reporting can sometimes lead to a lot of inconvenience for us, and it conceivably might have some very serious consequences. Take the case of a blow-out on the Texas line a couple of years ago. The break occurred in an open field near the little village of Moreno, which is about 10 or 12 miles east of Riverside. The 30-in. main at that point carries a pressure of about 500 lb, and the blow-out naturally made a great deal of noise. However, there was no fire and inasmuch as it was in an open field fully half a mile away from any structure, there was no danger whatever to any person or to any piece of property in the vicinity.

Where's The Fire?

"It is natural that the townspeople of Moreno were alarmed, and they called the sheriff's office. The sheriff's office in turn notified the county fire department, but no one seems to have thought about notifying the gas company. Reporters covering the sheriff's beat in Riverside got hold of the story and relayed it to the wire services, and within a very few minutes, radio reporters all over southern California were telling an alarmed audience about a gigantic blow-out on the Texas line. According to them, Moreno, which had become a city by this time, was being evacuated and the fire and law enforcement agencies of the county were momentarily expecting a gigantic explosion. Some people in Los Angeles who heard the broadcast got the idea that the line break was in San Marino*. Still others thought it was in Moreno Heights in downtown Los Angeles, and before we in the gas company downtown knew anything about it, our switchboard was flooded with calls. If a real emergency had occurred at this time, we would have been in very bad shape indeed. As it was, we had to let the line blow for reasons which have been explained here today. It was several hours before we dug down and welded a saddle around the main to stop the leak. And all this time we were besieged with calls about the situation.

"We felt, and we still feel, that the incident was greatly overplayed in the press and on the radio and that there was no real justification for the sensational treatment it got."

Sometimes, says the speaker, gas is blamed for an accident caused by something else—gasoline, or ammonia vapors, for example.

The idea is not, of course, to suppress news—but to keep it accurate. And here is where the fire department can be most helpful—by following the three procedures listed above.

Toward the middle of the program a "7th inning stretch" is taken and light refreshments are served, which gives those in attendance a chance to get acquainted. The atmosphere is kept informal, and questions are encouraged.

"Stand In Our Shoes"

A representative of the company summarizes the benefits his company has obtained from this program as follows: "We feel that our company has benefited from this program in several ways. They are all traceable to two points that are rather fundamental in human relations. One, it is easier to do business with an individual than with a company, and two, a person's actions are more understandable if his problems are understood. The Chinese have a good way of expressing this last point which goes, 'Let me stand in your shoes awhile and I will understand you better.'

"We have been attempting, and we think we have been successful to some extent, in promoting or improving existing good relations between our operating people and the fire protective services. We also think that we have given the firemen a chance to 'stand in our shoes awhile' so that they can understand why we do certain things when our product is involved in an incident.

"There have been a few rather direct benefits that we attribute in at least some degree to this program. The people in our claims department report increased cooperation on the part of the fire departments in giving them information. Our operating people report a greater degree of understanding on the part of the men in uniform which makes the work easier in repairing our facilities. The public has thus benefited because repairs have been made more rapidly, and fire departments are less prone to needlessly interrupt service over a wide area when only a small area of isolation around the site of the incident is needed.

Press Handling Improved

"By having the fire chief informed, and encouraging him to turn to us when he needs an answer, the number of incorrect, sensational and over-dramatized newspaper accounts of incidents involving gas have been reduced. A striking example of this point was demonstrated in two incidents that occurred in a nearby community. The first incident was caused by a bulldozer breaking a main in the street. The location of the break was such that it did not endanger surrounding property and it did not even catch on fire. The newspaper carried the following headline: FAST ACTION, LUCKY ATMOSPHERIC CONDITIONS AVERT GAS DISASTER. The article contained the statement that 'Firemen pointed out that there could have been serious developments had the weather not been just right. If it had been raining or calm, they explained, the "lethal vapor" might have seeped into many homes where fires were burning. Many persons could have been overcome. They said one spark could have ignited dozens of homes before any hasty evacuation could have been executed.'

"About a month later, approximately one block from the location of the main break, a woman attempted to commit suicide by gas, and as is often the case, a gas explosion resulted. In the meantime we had an opportunity to tell our story to the fire and police departments in the area. The same paper quoted previously carried the headline: WOMAN BADLY BURNED IN HOME EXPLOSION. The subhead stated, 'Investigators puzzled as to the source of the gas.' The story then went on to say that no gas leaks were found and the source of the gas was not determined. Further investigation positively indicated suicide.

"Recent statements by leaders of our industry have emphasized that re-establishing public confidence in the gas industry is of major importance at the present time. We believe that a program such as this is a 'grass roots' approach that will reduce public apprehension about gas."

*A large residential suburb of Los Angeles.

In this concluding installment, the author outlines tests made after installation and tallies results established in the survey.

Part 2

Corrosion Protection For New York City's Mains

By F. E. KULMAN
Consolidated Edison Co. of New York Inc.

Testing of Insulating Joints

IN stray current areas, a voltage drop of a few tenths of a volt usually existed across insulating joints installed in pipelines. This voltage difference fluctuated in magnitude and occasionally changed its polarity in accordance with the stray railway current flowing in the main. Such a voltage difference is usually regarded as prima facie evidence that the insulating joint is effective. Tests, however, were made to determine the resistance in ohms of all insulating joints.

The voltmeter-ammeter method was used. As shown in *Fig. 5c,* a 24-volt battery potential was applied between the pipes on opposite sides of the insulating joint and the current flow and voltage drop across the joint were measured. The measured resistance was an "apparent" resistance since a correction had to be made for the leakage of test current around the insulating joint through the coating and earth. The correct resistance of the insulating joint was computed from the test values of resistance of the insulating joint and coating on each side of the insulating joint, using the formulas shown in *Fig. 5.* A sample calculation is given in *Appendix A.*

Measurement of Coating Resistance

The measurement of coating resistance of insulated sections was made by applying battery potential of 24 volts between the coated pipe and buried bare pipes and recording voltage drop through the coating and soil, and the current flowing through the coating. *(See Fig. 5c.)* In a congested metropolitan area, it is known that the bare water mains and gas pipes are in intimate electrical contact through connections within the consumers' premises. Furthermore, the a-c electric system, being grounded to the water services, tends to reduce the resistance of the water pipe to "ground." Hence the bare piping systems provided a good test electrode for measurement of coating resistance so that the measured resistance could be considered as being comprised almost entirely of coating resistance. The resistance of the soil path between the coated main and nearby parallel bare pipes was negligible.

Since the quality of the coating was very high, investigation was made of leakage of test current through the insulating joints at the ends of the section under test. This leakage proved to be a significant factor in many areas and was required to be taken into account in computing the coating resistance. The field procedure was to measure the coating resistance of the sections on both sides of the insulating joint and the resistance of the insulating joint. By means of formulas shown in *Fig. 5c* the resistances of the coated pipe sections were readily computed. A sample calculation is given in *Appendix A.*

TABLE 1. Specified Coating Resistances

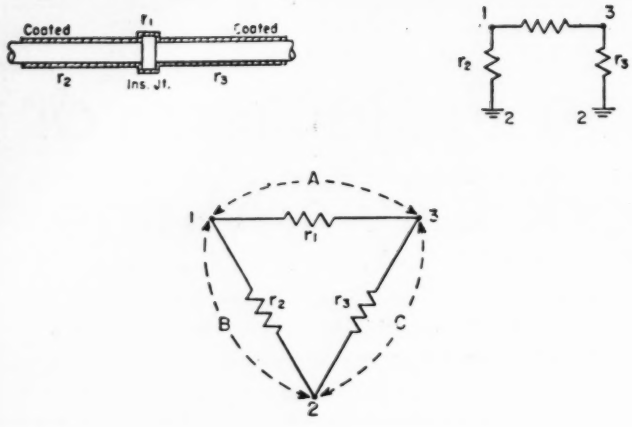
Pipe Size	Coating Area Sq Ft Per 1000 Ft Pipe	Coating Resistance Required Ohms Per 1000 Ft Pipe A	B
30	7850	80	65
24	6290	80	65
20	5240	100	80
16	4190	120	100
12	3340	120	100

Over-the-Ground Survey of Coated Pipe

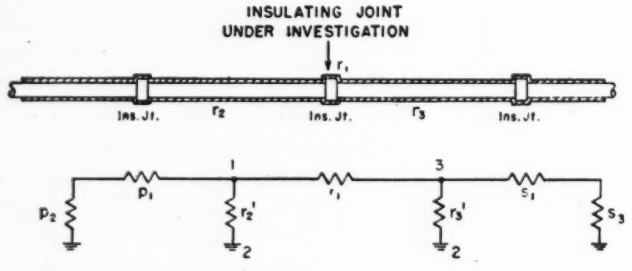
After a section of pipe had been installed, covered with earth and wetted down, a coating resistance test was made on the installed section. The specified coating resistances for the different sizes of pipes were as shown in *Table 1.*

When the resistance was equal to or greater than the values under column A, the coating was considered satisfactory and no further action was required. Where the resistance was equal to or less than the values given under column B, an over-the-ground survey was made to locate breaks in the coating. The pipe was excavated at locations where breaks were indicated and the coating repaired to bring its resistance up to the B values. Where the resistance fell between the A and B values, an over-the-ground survey was made and the results referred to the engineering department field representative for decision as to excavating and repairing the coating.

The electrical circuit for making the over-the-ground survey is shown in *Fig. 6.* The voltage from 24-volt battery is applied intermittently, through an interrupting device, between the coated pipe and ground. This caused the potential of the coated pipe to become 24 volts negative with respect to the earth when the voltage was applied, and approximately zero when the circuit was interrupted. The voltage difference between two points on the ground surface directly above the pipe was measured with a model 622 high resistance voltmeter. In practice, one probe was placed at a convenient fixed point in the earth at which the potential was unaffected by the battery voltage, and the second probe was moved along the route of the pipe. Measurements of the voltage drop on the street surface usually were made at 5-ft intervals along the pipe route. Explora-



Figs. 5a (top) and 5b (bottom) show formulas used to compute resistance of the joint from the test values of resistance of the insulating joint and the coating on each side of the joint.



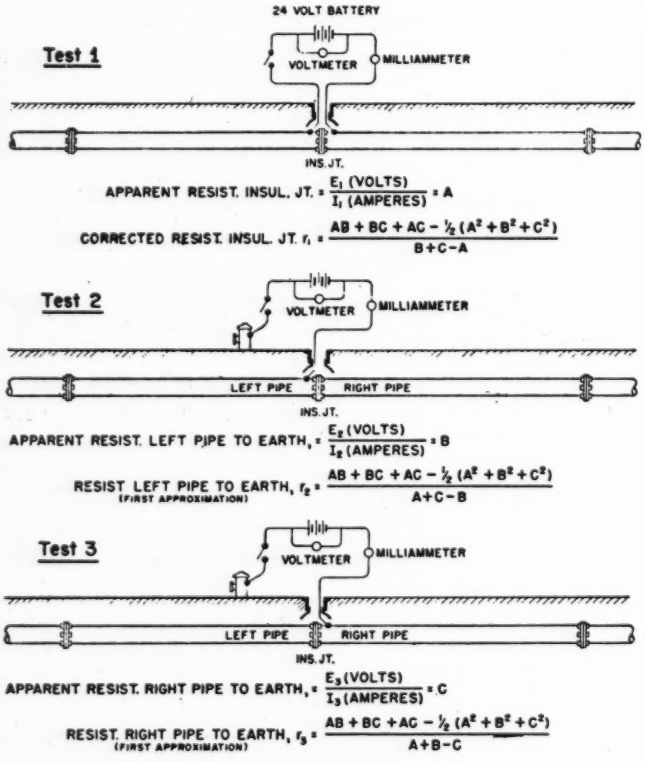

24 VOLT BATTERY
Test 1
VOLTMETER
MILLIAMMETER
INS. JT.
APPARENT RESIST. INSUL. JT. = E1 (VOLTS) / I1 (AMPERES) = A
CORRECTED RESIST. INSUL. JT. r1 = (AB + BC + AC − ½ (A² + B² + C²)) / (B + C − A)
Test 2
VOLTMETER
MILLIAMMETER
LEFT PIPE
RIGHT PIPE
INS. JT.
APPARENT RESIST. LEFT PIPE TO EARTH, = E2 (VOLTS) / I2 (AMPERES) = B
RESIST LEFT PIPE TO EARTH, r2 = (AB + BC + AC − ½ (A² + B² + C²)) / (A + C − B)
(FIRST APPROXIMATION)
Test 3
VOLTMETER
MILLIAMMETER
LEFT PIPE
RIGHT PIPE
INS. JT.
APPARENT RESIST. RIGHT PIPE TO EARTH, = E3 (VOLTS) / I3 (AMPERES) = C
RESIST. RIGHT PIPE TO EARTH, r3 = (AB + BC + AC − ½ (A² + B² + C²)) / (A + B − C)
(FIRST APPROXIMATION)

Fig. 5c. Voltmeter-ammeter method of determining resistance in ohms of all insulating joints.

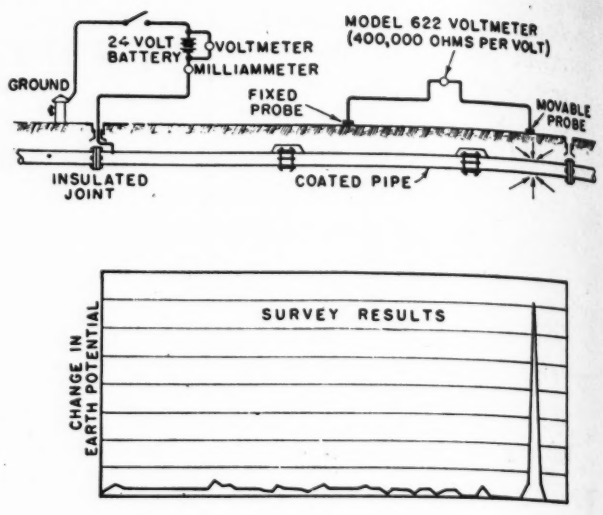


Fig. 6. Electrical circuit for making the over-the-ground survey of coated pipe and the results of a typical survey.

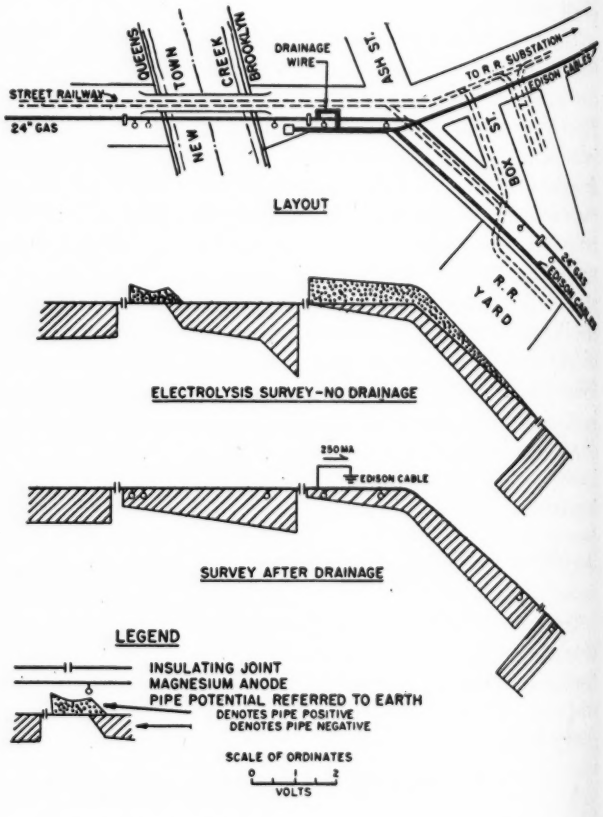


Fig. 7. Piping layout and electrolysis condition at the Newton Creek crossing.

tion at closer intervals down to one foot was made when an apparent fault was indicated. The results of a typical survey are plotted in *Fig. 6.*

Pipe-to-Earth Potential Measurements

Measurements of the potential of the pipe referred to earth was made with a high resistance voltmeter, model 622, having ranges of 1-0-1 and 5-0-5 volts, and an internal resistance of 400,000 ohms per volt. The connection to the pipe was made at the test stations provided at insulating joints and at the points of connection of the magnesium anodes. Valve stems provided connections where test leads were not installed.

The earth probe consisted simply of a pointed steel rod, ½-in. in diameter, and 12 in. long. This was driven into the pavement above the route of the main and served to indicate the potential of the soil surrounding the coated main. The bar was wiped dry with a clean cloth after each use.

Some objection might be raised as to the reproducibility of the readings obtained with the steel earth probe. Check tests showed that the voltage readings usually could be reproduced within 0.05 volt. In congested streets containing bare water and gas mains, and many cables and conduits carrying long-line galvanic and stray currents, this degree of accuracy was entirely acceptable and indicated that the influence of polarization and local cells on the earth probe was insignificant. It is doubted whether the accuracy of measurements would have been increased with a copper-copper sulfate earth electrode.

Stray Currents at Newton Creek

Stray currents were not particularly severe at any point except at the submarine crossing at Newton creek between Brooklyn and Queens. At this point stray trolley currents in Greenpoint raised the earth potential in Brooklyn and caused stray earth currents to flow north to Queens. A layout of the pipes at this crossing is shown in *Fig. 7.*

Insulating joints had been installed at both ends of the Newton creek crossing in accordance with long standing practice in corrosion protection for submarine pipes. It was found that the stray currents caused positive pipe-to-earth potentials of 1.0 volt to exist at the insulating joint at the Brooklyn shore and 0.5 volt at the insulating joint at the Queens shore. Connecting the magnesium anodes to the main had little in-

TABLE 2. Electrolysis Survey of Natural Gas Main

Ins. Joint	Location of Ins. Jt.	Section Length Ft	Coating Resist. Ohms Per 1000 Ft	Section Anode Current Milliamp.	Pipe to Soil Potential-Volts* Pos.	Pipe to Soil Potential-Volts* Neg.
	MANHATTAN					
30-in. Main, Hudson River to Harlem River						
M 1	At Hudson River, N/O 133rd St.	350	67	8	—	.56
M 2	W. 133rd St. W/O 12th Ave.	460	33	6	—	1.0
M 3	W. 133rd St. E/O 12th Ave.	3,240	33	23	—	.80
M 4	W. 136th St. W/O St. Nicholas Ave. (In Park)	2,280	62	9	—	.91
M 5	W. 135th St. W/O Lenox Ave.	2,120	55	23	—	.60
M 6	E. 135th St. E/O Madison Ave.	1,150	2	260	—	.60
	THE BRONX					
30-in. Main, Harlem River to Hell Gate						
B 1	Exterior St. at E. 135th St.	970	10	126	—	.60
B 2	Major Deegan Blvd. (E. 135th St.) E/O Rider Ave.	670	26	16	—	.82
B 3	E. 135th St. E/O Lincoln Ave.	950	103	4	—	1.0
B 4	E. 135th St. W/O Willis Ave.	1,880	68	23	—	.55
B 5	E. 135th St. W/O St. Ann's Ave.	2,350	141	38	—	.76
B 6	E. 132nd St. E/O Cypress Ave.	2,095	27	65	—	.76
B 7	E. 132nd St. E/O Locust Ave.	180	0	150	.12	—
24-in. Main, to Hunts Point						
B 8	E. 135th St. E/O St. Ann's Ave.	3,600	32	56	—	.52
B 9	Jackson Ave. N/O St. Mary's St.	3,560	24	35	—	.36
B 10	Timpson Pl. W/O Bruckner Blvd.	3,400	17	56	—	.30
B 11	Randall Ave. W/O Craven St.	1,560	27	40	—	.40
B 12	Oak Point Ave. W/O Barretto St.	2,900	61	19	—	.50
B 13	Hunts Point Ave. S/O East Bay Ave. 24-in. Main	185	93	100	—	.08
B 14	Hunts Point Ave. S/O East Bay Ave. 16-in. Main	200	0	132	.12	—
	QUEENS					
20-in. Main, Astoria to Flushing						
Q 1	Astoria Gas Plant S/O Tunnel Head House	109	595	8	—	.40
Q 2	Astoria Gas Plant Opposite 18th St.	2,150	74	4	—	1.1
Q 3	Astoria Gas Plant Opposite 27th St.	1,000	30	4	—	.74
Q 4	20th Ave. E/O 31st St.	2,350	43	7	—	.50
Q 5	20th Ave. E/O 42nd St.	4,150	27	31	—	.28
Q 6	Astoria Blvd. E/O 77th St.	2,200	6	240	—	.18
Q 7	Astoria Blvd. E/O 85th St.	1,945	65	14	—	.58
Q 8	Astoria Blvd. E/O 92nd St.	3,400	75	12	—	.24
Q 9	Astoria Blvd. E/O 104th St.	2,646	54	9	—	.44
Q 10	Astoria Blvd. E/O 112th Pl.	900	95	6	—	.86
Q 11	Northern Blvd. E/O Grand Central Pkwy.	2,720	106	7	—	.54
Q 12	Northern Blvd. at 126th St.	1,800	51	29	—	.71
Q 13	Tully & DiNapoli Yard Near Tunnel Shaft W/O Flushing Creek	600	0	290	—	.35
Q 14	Tunnel Head House at Lawrence St. E/O Flushing Creek	3,840	34	41	—	.30
16-in. Main, Flushing to City Line						
Q 15	35th Ave. at Leavitt St.	3,547	135	22	—	.42
Q 16	35th Ave. at 150th St.	3,760	160	10	—	.52
Q 17	35th Ave. at 164th St.	3,430	85	17	—	.42
Q 18	35th Ave. at 193rd St.	2,755	363	5	—	.66
Q 19	42nd Ave. at 201st St.	4,810	65	20	—	.18
Q 20	43rd Ave. at 214th Pl.	3,115	98	15	—	.56
Q 21	Northern Blvd. at 233rd St.	3,605	298	49	—	.76
Q 22	Northern Blvd. at Alameda Ave.	3,520	339	8	—	.60
Q 23	Northern Blvd. at Browvale Lane	2,685	195	8	—	.70
Q 24	Lakeville Rd. at Concord St. (City Line)	—	—	—	—	.74
24-in. Main, Astoria to Newton Creek						
Q 25	Astoria Plant E/O Shore Blvd.	3,200	219	23	—	.16
Q 26	Shore Blvd. N/O Hoyt Ave.	2,460	99	14	—	.60
Q 27	14th St. N/O Shore Blvd.	2,550	169	7	—	.87
Q 28	14th St. N/O Broadway	3,200	95	39	—	.96
Q 29	12th St. S/O 36th Ave.	3,000	114	36	—	.56
Q 30	12th St. N/O 41st Road	2,450	178	16	—	.64
Q 31	10th St. S/O 44th Ave.	2,300	181	39	—	1.3
Q 32	Vernon Blvd. N/O 48th Ave.	450	0	14	—	.12
Q 33	Vernon Blvd. S/O 49th Ave.	1,000	108	48	—	.11
Q 34	Vernon Blvd. N/O Newton Creek	500	1	185	—	.40

*Pipe-to-Soil Potential measured with 400,000 ohm voltmeter and steel probe.

Appendix A. Measurement of Insulated Joint and Coating Resistance

The result of measurement of the insulation resistance of an insulating joint installed in a buried line is in error because the test current includes a portion which leaks through the earth around the joint, in addition to the current which flows through the insulating joint. Conversely, when measuring the insulation resistance of a section of coated pipe the measured value is in error because of leakage from the pipe section through the insulating joints at the ends. Formulas are given below for correcting the measured value of resistances of insulating joints and coatings.

Let A represent the measured value of resistance of the insulating joint and let B and C represent the measured values of resistance of pipe to earth on the two sides of the insulating joint. Referring to *Fig. 5a*, it can be seen that the resistance A, B, and C represent a delta assembly of resistances in which r_1 is the true resistance of the insulating joint, and r_2 and r_3 represent the resistance of the pipe to ground on the two sides of the insulating joint.

A resistance measurement A between points 1 and 3 of the triangle includes the resistance r_1 in parallel with resistance r_2 plus r_3. Similarly, the resistance measurement B between points 1 and 2 will include resistance r_2 in parallel with resistance r_1 plus r_3; and the resistance measurement C between points 2 and 3 will include resistance r_3 in parallel with resistance r_1 plus r_2. Three algebraic equations may be written, as follows:

$$A = \frac{1}{\frac{1}{r_1} + \frac{1}{r_2 + r_3}} \qquad B = \frac{1}{\frac{1}{r_2} + \frac{1}{r_1 + r_3}} \qquad C = \frac{1}{\frac{1}{r_3} + \frac{1}{r_1 + r_2}}$$

Simplifying the denominators results in:

$$A = \frac{r_1\ (r_2 + r_3)}{r_1 + r_2 + r_3} \qquad B = \frac{r_2\ (r_1 + r_3)}{r_1 + r_2 + r_3} \qquad C = \frac{r_3\ (r_1 + r_2)}{r_1 + r_2 + r_3}$$

Since these three equations are independent and contain three unknowns, they may be solved simultaneously by algebraic methods, and the following solutions result:

$$r_1 = \frac{AB + BC + AC - \frac{1}{2}\ (A^2 + B^2 + C^2)}{B + C - A}$$

(Correct resistance of ins. joint.)

$$r_2 = \frac{AB + BC + AC - \frac{1}{2}\ (A^2 + B^2 + C^2)}{A + C - B}$$

(Approximate resistance of coating, one side.)

$$r_3 = \frac{AB + BC + AC - \frac{1}{2}\ (A^2 + B^2 + C^2)}{A + B - C}$$

(Approximate resistance of coating, other side.)

in which r_1 is the true resistance of the insulating joint and r_2 and r_3 represent the resistance of pipe to ground on the two sides of the insulating joint.

In a line with many insulating joints r_2 and r_3 are the resistances of finite lines consisting of coating resistances to ground (parallel elements) and insulating joint resistances (series elements). Thus r_2 and r_3 represent pessimistic values of the coating resistances of the insulated pipe sections immediately adjacent to the insulating joint under test. If it is required to obtain the exact value of the pipe coating resistances, tests are required to be made at the adjacent insulating joints, and the approximate value of coating resistance corrected as discussed below.

Referring to *Fig. 5b*, the resistance r_2 can be replaced by the coating resistance of the left section r_2' in parallel with the resistance of the left insulating joint, p_1, plus the resistance of the remainder of the line, p_2. Thus:

$$\frac{1}{r_2} = \frac{1}{r_2'} + \frac{1}{p_1 + p_2}$$

which, when solved for the pipe coating resistance r_2' gives

$$r_2' = \frac{1}{\frac{1}{r_2} - \frac{1}{p_1 + p_2}}$$

Similarly, the resistance r_3 can be replaced by the coating resistance of the right section r_3', in parallel with the resistance of the right insulating joint S_1, plus the resistance of the remainder of the line, S_3. Thus:

fluence on changing the pipe potentials.

Tests on the Brooklyn gas main south of the creek showed a voltage drop of 2.5 volts across the insulating joint. The pipe potential was 4.0 volts negative with respect to the trolley rails but 1.5 volts positive with respect to the water pipe and Edison cable sheath. Tests showed that drainage of 0.25 ampere of stray current from the gas pipe to the Edison cable sheaths reduced the potential of the gas pipe to a safe negative value without jeopardizing the electric cables. Based on the test results, a drainage bond was installed permanently between the gas pipe and the Edison cables as shown in *Fig. 7*. This corrected the electrolysis condition at the Brooklyn shore.

The situation at the Queens shore was less severe than in Brooklyn. This was corrected by installing a second anode at the Queens end of the submarine crossing, which resulted in correcting the positive pipe potential.

TABLE 3. Coating Resistances and Cathodic Protection Requirements

Pipe Size In.	Length Ft	Area Sq Ft	Coating Resistance Ohms Per Sq Ft	Magnesium Protective Current: Milliamperes	Magnesium Protective Current: M.A. Per Sq Ft
30	23,733	186,000	809,000	751	.0040
24	36,515	229,000	502,000	879	.0038
20	29,810	156,000	551,000	702	.0045
16	31,227	131,000	411,000	154	.0012
All sizes	121,285	702,000	590,000	2484	.0035

Results of Electrolysis Surveys

The results of the tests on the completed line are given in *Table 2*. This table lists the locations of the insulating joints, length of insulated sections, the coating resistance per 1000 ft of pipe length, the protective current generated by the magnesium anodes, and the resultant pipe potential referred to the surrounding soil.

Reference to *Table 2* shows that 52 of the 54 sections are negative with respect to the earth by potentials averaging approximately 0.5 volt. This potential is slightly higher than the 0.25 to 0.30 volt usually considered as indicating protection. These sections can be considered well protected, and there exists a margin of protection which will be utilized in the future as slow decreases occur in the coating electrical resistance.

A small positive pipe potential of

$$\frac{1}{r_3} = \frac{1}{r_3'} + \frac{1}{S_1 + S_3}$$

Again solving for the pipe coating resistance r_3', gives:

$$r_3' = \frac{1}{\frac{1}{r_3} - \frac{1}{S_1 + S_3}}$$

If the resistance r_1 of the insulating joint is high compared with the coating resistances, or vice versa, then the measured resistance A, B, and C become very critical, and the measurements have to be made with the utmost accuracy.

The measured resistances A, B, and C must be such that the sum of any two must always be greater than the third. Otherwise the solution cannot be obtained.

Sample computation. To illustrate the method of solution, the following example is solved:

Given: Resistance measured across insulating joint, A = 80 ohms
" " between pipe 1 and earth, B = 30 ohms
" " between pipe 2 and earth, C = 60 ohms

Required: To compute the correct value of resistance of the insulating joint, and of each pipe to earth.

The correct value of insulation resistance of the joint is computed:

$$r_1 = \frac{AB + BC + AC - \frac{1}{2}(A^2 + B^2 + C^2)}{B + C - A}$$

$$r_1 = \frac{80 \times 30 + 30 \times 60 + 80 \times 60 - \frac{1}{2}(80^2 + 30^2 + 60^2)}{30 + 60 - 80}$$

$r_1 = 355$ ohms

The approximate value of pipe to earth resistance on one side of the joint is:

$$r_2 = \frac{AB + BC + AC - \frac{1}{2}(A^2 + B^2 + C^2)}{A + C - B}$$

$$r_2 = \frac{80 \times 30 + 30 \times 60 + 80 \times 60 - \frac{1}{2}(80^2 + 30^2 + 60^2)}{80 + 60 - 30}$$

$r_2 = 32.3$ ohms

To illustrate the method of correction when exact measurements are required, let us assume that tests at the adjacent insulating joint show p_1 and p_2 to be 300 and 30 ohms respectively. Then the corrected value of coating resistance is:

$$r_2' = \frac{1}{\frac{1}{r_2} - \frac{1}{p_1 + p_2}}$$

$$r_2' = \frac{1}{\frac{1}{32.3} - \frac{1}{300 + 30}}$$

$r_2' = 35.7$ ohms

The approximate value of pipe to earth resistance on the other side of the joint is:

$$r_3 = \frac{AB + BC + AC - \frac{1}{2}(A^2 + B^2 + C^2)}{A + B - C}$$

$$r_3 = \frac{80 \times 30 + 30 \times 60 + 80 \times 60 - \frac{1}{2}(80^2 + 30^2 + 60^2)}{80 + 30 - 60}$$

$r_3 = 71$ ohms

If tests at the adjacent insulating joint show S_1 and S_3 to be 300 and 30 ohms respectively, then the corrected value of coating resistance is:

$$r_3 = \frac{1}{\frac{1}{r_3} - \frac{1}{S_1 + S_3}}$$

$$r_3' = \frac{1}{\frac{1}{71} - \frac{1}{300 + 30}}$$

$r_3' = 90$ ohms

It is seen that the tested value of insulating joint resistance is less than 25% of the corrected value. Omission of the correction results in an error of more than 75%.

Similarly, the measurements of the pipe coating resistance are 15 to 33% less than the corrected values. Errors of this magnitude are encountered if corrections are not made to the test values as indicated above.

0.12 volt referred to earth exists for a short section on East 132nd street, near the Hell Gate shaft of the Hell Gate-Astoria tunnel. The magnesium anode installed at this point is partially ineffective in correcting this potential because the 26-in. main is in contact with the bare structures in the Astoria-Hell Gate tunnel. The tunnel structures, however, are protected against electrolysis by a cathodic protection circuit at Astoria and the length of pipe subject to the small positive potential is comparatively short, 180 ft.

At Hunts Point, a short section of the piping on the plant side of the insulating joints near the property line on Hunts Point avenue is 0.12 volt positive with respect to the earth. The magnesium anodes again are not totally effective because the gas main is connected to a large mass of bare piping within the plant.

The section of 20-in. main carried through the gas tunnel under Flushing river is in contact with the bare steel structures in the tunnel. The potential of the pipe entering the shafts, however, was 0.35 volt, negative with respect to the earth, and the pipe appears to be adequately protected.

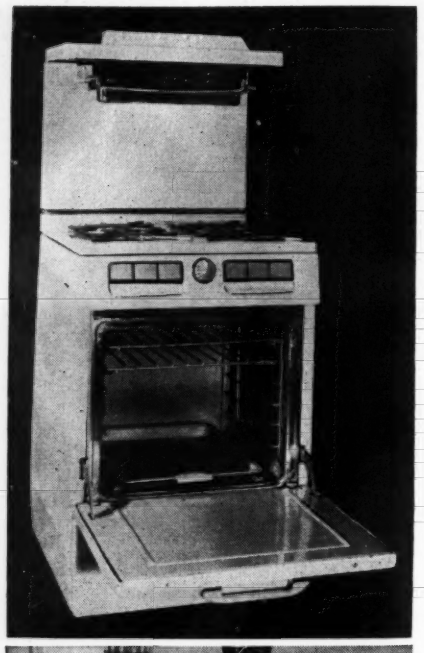
At Vernon boulevard in Queens, the 24-in. main is in metallic contact with the bridge over the Long Island Railroad steam division. This contact was anticipated in the design and insulating joints were installed at 48th and 49th avenues to reduce the exposure of pipe not protected by magnesium anodes. The electrolysis surveys showed that the short section of pipe across the bridge is 0.12 volt, negative with respect to the earth, and apparently safe from the electrolysis standpoint.

Significant facts on the coating resistances and cathodic protection requirements for the various sizes of pipe are given in *Table 3*.

The average insulation resistance of the coating as installed amounted to 590,000 ohms per sq ft. This is a relatively high value and reflects the large amount of inspection and testing required to obtain this degree of protection.

As a consequence of the excellent coating resistance the total cathodic protection current required for the main was only 2434 milliamperes (2.48 amp). This amounts to an average of 108 milliamperes (.108 amp) per mile of pipe. If this average is maintained, the expected life of the magnesium anodes should be well in excess of 20 years.

It is expected that in the course of time, the coating resistance may decrease because of accidental mechanical damage due to construction operations in the city streets. In such an event, the magnesium current will automatically increase to supply the exposed area with protective current. It is planned to make periodic surveys of the main in order to detect major changes in the electrolysis and corrosion protection system.



BOW-FRONT COOKER. Flavel's moderately priced model has a plate rack, interchangeable burners, extra large grill, thermostatic oven control.

COOKER. The Parkinson "Coronation Renown" (left) is hailed as advanced design, has a triangulated shape with sloping front. Grill has been moved up from waist level to eye level, permitting better visibility for the cook as well as a larger surface that can accommodate six slices of toast. Ignition is automatic.

GAS-ELECTRIC WASHING MACHINE. Water is heated by gas, clothes are agitated by electricity. With a washing capacity of 3½ lbs (dry weight), and a boiling capacity of 7 lbs, this model is mounted on rollers for storage under the drain board when not in use. The wringer folds down by means of self-locking brackets, and may be covered by a removable table top.

WHAT'S COOKING IN BRITAIN

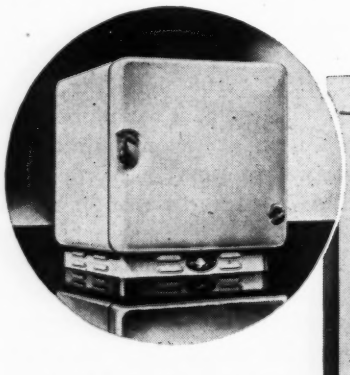
(and heating water and refrigerating)

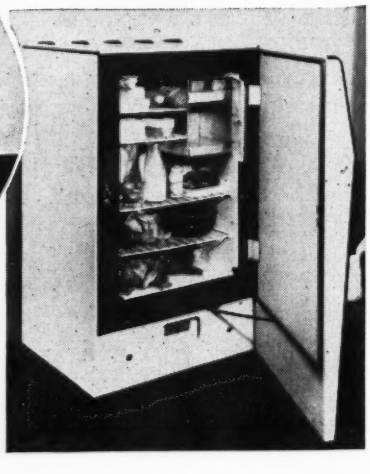
SEVERAL ingenious, unique applications of gas for domestic uses made their debut at the recent Ideal Home Exhibition put on at London under sponsorship of the *Daily Mail*. Two new gas refrigerators, "cookers" featuring eye-level grill, a portable gas-and-electric washing machine were among the eye-catchers in the coordinated gas section display.

A trend was in evidence: Britons are becoming more "streamline" conscious, stressing beauty as well as utility in their home appliances. Bow-fronts, sloping fronts, rounded corners, hidden hinges were among the style innovations.

Thirteen firms participated in the combined section, grouped around a central pavilion sponsored by the National Gas Council.

GAS REFRIGERATOR. Box fronts are out in the newest Gasel refrigerators. Black plastic trim provides protection for the glossy white enamel. Door closes by new "trigger-action" door lock.





BABY REFRIGERATOR. Astral's new 1½-cu ft box offers economy and a saving in space. It can either be installed as a wall fitting or mounted on a stand.

PAVILION. "Bouquet for Housewives" was the theme of central display sponsored by the National Gas Council. Instantaneous hot water heaters in center, refrigerators in foreg

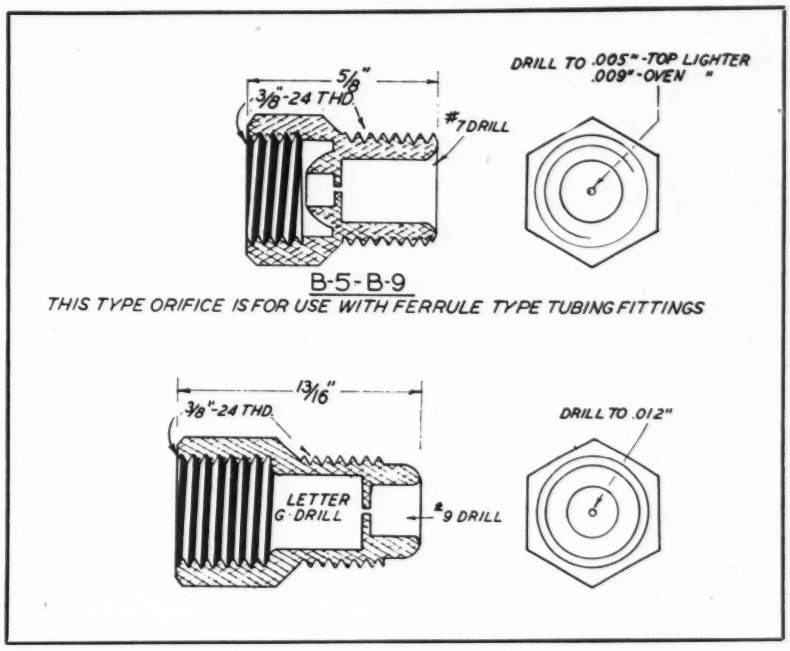


Fig. 1. Orifice used with ferrule type tube fittings (above) and for use on water heaters using Grayson controls.

Fixed Orifices

For Prevention of Pilot Valve Stoppages

By CHARLES CONSTERDINE
Pacific Gas & Electric Co.
San Francisco

GAS appliance pilot outages caused by pilot valve stoppage started as a problem about 30 years ago when constant-burning pilots began to replace the match for lighting domestic gas burners. Through the years, this troublesome problem has been increasing until today pilot outages in this company's operations make up 48% of all customer requests for appliance service. For the year 1951 this amounted to 196,000 service calls at an expense of over $300,000.

Pilot outage from clogging of pilot control valves occurs with both manufactured and natural gases. In the case of the former, the offending component of the gas is the vapor phase gum which, although present in only minute amounts, collects and builds up in pilot valve openings to ultimately extinguish the pilot flame. In natural gas systems tiny dust particles, composed primarily of corrosion products from former manufacturing operations, but also including similar material from transmission systems, will likewise collect in pilot valves and obstruct gas flow. Unlike gums which are present in manufactured gas the year round, the service troubles with dust in natural gas systems occur mainly during the winter season when stirred up in mains, services, and houselines by heavier loads and comes at a time when our service forces are least able to handle an increased work load.

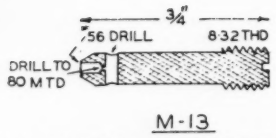
Fortunately for the manufactured gas utilities, the American Gas Assn. has taken official recognition of this specific service trouble in that case and for the last several years has required filter protection for all constant-burning pilots of appliances approved for that kind of gas. For natural gas appliances, however, no such pilot protection has been required by AGA as yet, although long needed. As a result, natural gas utilities have had to provide their own protection to pilots from entrained dust by employing various means ranging from major operations, such as reducing pipeline velocities by reinforcement of the area or conversion to a higher pressure, or by keeping the dust in place by fogging or removal, through entrapment in filters in mains and services, to other comparatively minor but more numerous operations applied to the pilot itself through filters or other devices in the pilot lines.

While the foregoing major preventive means are effective, they are also expensive in capital costs, if full coverage for a large system is to be obtained. In addition, there is another disadvantage in that they cannot be applied immediately when trouble occurs in a part of the system not so protected. For this reason, in the operating area with which I am concerned, where pilot outages are rather evenly distributed over an area of roughly 75 square miles, a simple, effective remedy capable of being quickly applied is needed. Hence, we have looked to the pilot itself and have used filters and fixed orifices. Since speed of installation is a necessary requirement to handle peak work loads, our main effort has been on fixed orifices rather than the conventional filters on the market which require appreciably longer time to install.

Our use of fixed orifices was prompted largely by the material contained in Guy Corfield's report as chairman of the 1934 PCGA committee (PCGA *Proceedings*, Vol. 25), set up to study pilot outages, in which he stated, "A large proportion of pilot outage complaints is caused by gas main dust. It is the opinion of all contributors that a circular fixed orifice most effectively resists dust stoppage by allowing the dust particles to pass through harmlessly; and it is their recommendation that this type of orifice be used whenever possible."

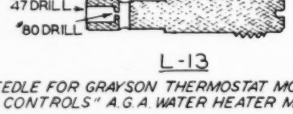
In the same report Mr. Corfield showed that the maximum size gas-borne dust particle in a pilot supply tube has a diameter dimension of only 1/17th that

Presented at the PCGA technical section, customer service conference in Los Angeles, April 15-17.



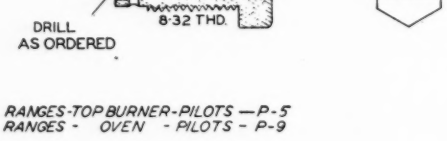
M-13

PILOT NEEDLE DOMESTIC THERMOSTAT MODEL HT-1 PAGE 11 } A.G.A. W.H. MANUAL DOMESTIC THERMOSTATS
PILOT NEEDLE DOMESTIC THERMOSTAT MODEL HT-2 PAGE 14 }



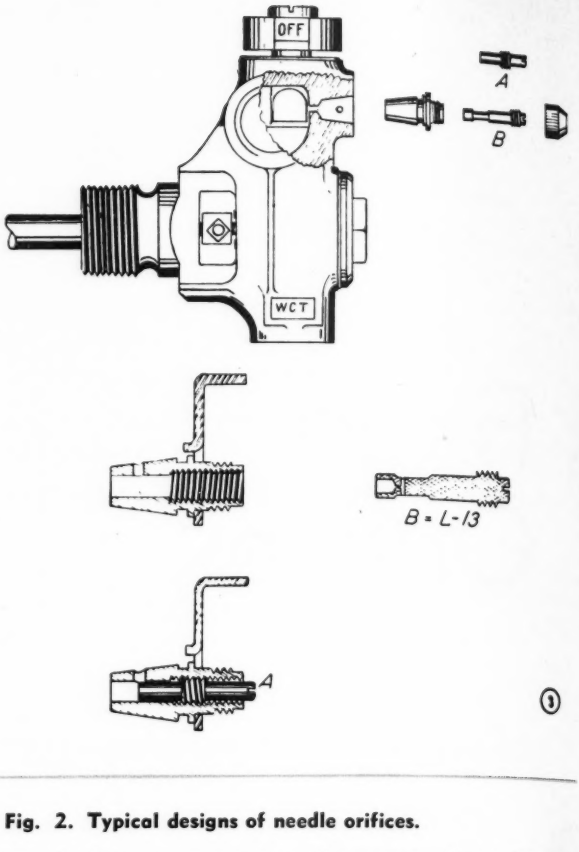
L-13

PILOT NEEDLE FOR GRAYSON THERMOSTAT MODEL W.C.T. PAGE-9 "GRAYSON CONTROLS" A.G.A. WATER HEATER MANUAL.



RANGES-TOP BURNER-PILOTS — P-5
RANGES - OVEN - PILOTS - P-9

(2)



(3)

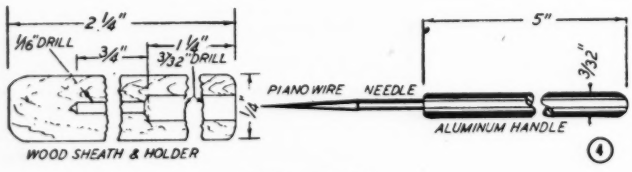
Fig. 2. Typical designs of needle orifices.

Fig. 3. Grayson snap-action thermostat, Model WCT, showing detail of pilot needle replacement with an L-13 aluminum orifice needle.

Fig. 4. Round-point broach used to increase orifice sizes.

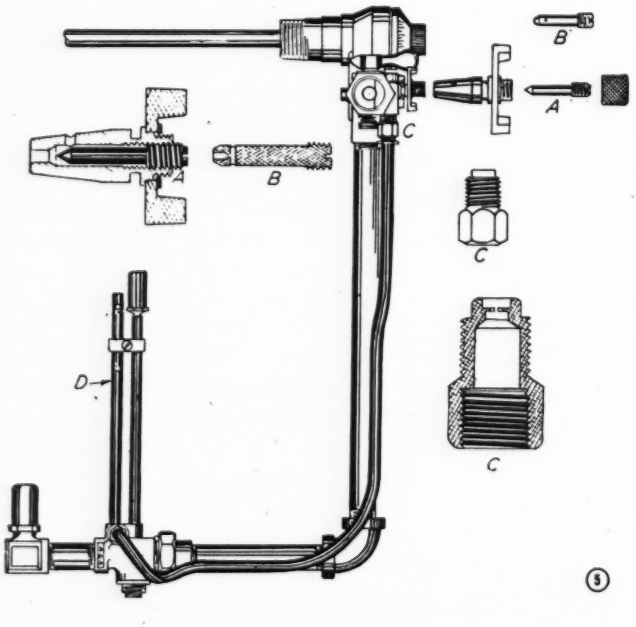
Fig. 5. The M-13 aluminum needle (B) replaces brass needle (A) in Domestic thermostat, Model HT-1. The cap orifice (C) in the supply line is optional. Pilot orifice (D) has a normal .018-in. diameter drilling as compared with the .013-in. drilling in the aluminum orifice.

Fig. 6, similar to Fig. 5, shows the location of the L-13 needle (B) or the G-12 cap orifice (C) in Grayson model WCT with a W52 pilot.



(4)

ORIFICE BROACH
FIGURE - 4



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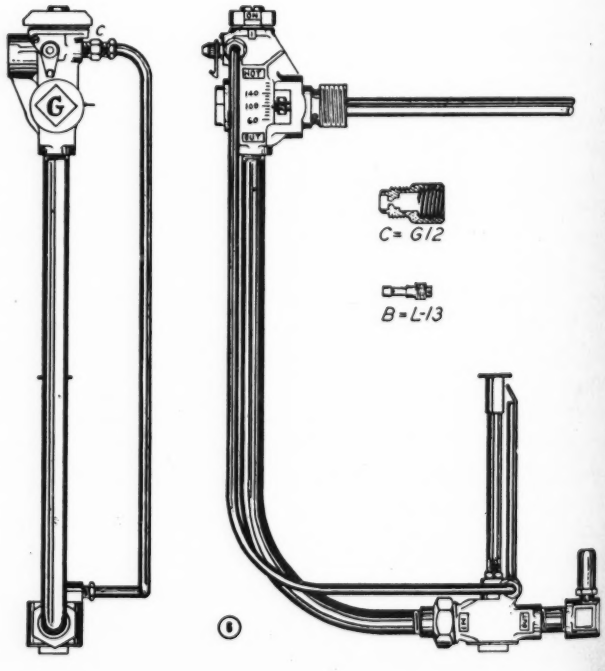


(6)

of an 80 MTD pilot orifice. He further showed that this dust particle having a diameter of 0.0008 in. can very readily become lodged in the .0005-in. annular ring orifice of a needle valve or in the small oval opening of a nearly closed plug type pilot valve.

Laboratory tests made in our company indicate the service life of a fixed orifice is, on the average, 60 times that of the unprotected pilot valve.

Our first devices utilizing the fixed orifice idea were made from brass stock and were designed to be inserted in the pilot line in the compression fitting generally present in most pilot lines. A typical fixed orifice fitting is shown in *Fig. 1.* While approximately 18 different styles were made to take care of the assorted fitting sizes of different manufactures, the bulk of pilots was taken care of by seven principal types. For our system, with 1050-Btu natural gas and 6-in. - 8-in. service pressures, orifice sizes of 0.005-in. diameter for top lighters, 0.009-in. diameter for ovens, 0.011-in. for storage water heaters, and 0.014-in. for furnaces reproduced for all practical purposes the same size pilot flame as though set with an adjustable valve.

Records maintained of initial installations showed spectacular improvment; pilots that were being extinguished in a day or less with the conventional valve control gave uninterrupted service after being equipped with a fixed orifice. The use of fixed orifices became the usual means of correcting pilot outage due to dust stoppage. The installation is relatively simple; merely uncouple the compression fitting, reassemble with the fixed orifice fitting as a part of the compression coupling, and open wide the pilot adjustment valve.

TABLE 1. Pilot Outages Before and After Installation of Fixed Orifices

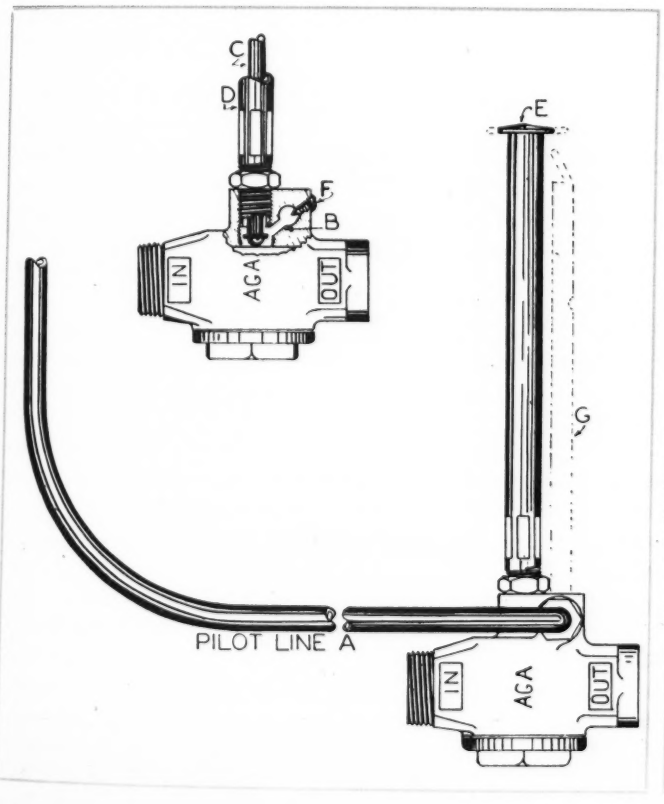
	Water Heaters	Oven	Top Pilot	Broiler	Range Cir. Htr.	Floor Furn.	Total
Orifices installed	36	14	5	4	3	2	64
Outages — 2 years prior to fixed orifice	186	71	23	21	22	6	329
Outages during following winter	9	5	5	4	1	0	24
Appliances having no outages during following winter	31	12	3	2	2	0	50

Failures Accelerate

About five years ago, however, pilot outages began to accelerate, involving many recently installed fixed orifices as well as older ones. Failure was due to closure of the orifice hole by a sulfide deposit. The obvious remedy was to change to a corrosion-resistant material such as aluminum, which was done. At the same time, as suggested in Mr. Corfield's report, re-examination of the procedure indicated the obvious advantage, from an installation viewpoint, of incorporating the fixed orifice in the needle of the pilot needle valve. This necessitated a mere changing of needles, and led to the designing of a series of fixed orifice needles. A typical design is shown in *Fig. 2.* At this date 10 styles of needles are provided; these take care of the bulk of pilot assemblies so equipped.

In this study, orifices have been identified by a letter and a number; for example, the L-13 orifice needle, *Fig. 2,* is for the Grayson water heater thermostats shown in *Fig. 3.* The "L" indicates the orifice types and the "13" the drill size (.013 in. diam. drill). Similarly, the P-5 and P-9 orifices, *Fig. 2,* are range pilot needles. "P" identifies a needle having a special thread and the "5" and "9" indicate drillings of .005-in. for the top pilots and .009-in. for oven and broiler pilots. The drillings are minimum stock sizes and are correct for low-pressure distribution where gas pressures on the pilot orifice may be 8-in. wc. A larger orifice may be needed on less orifice pressure. Orifices can be increased with a broach.

The serviceman carries a long, thin tapered round-point broach *(Fig. 4)* having a point less than .005 with which he



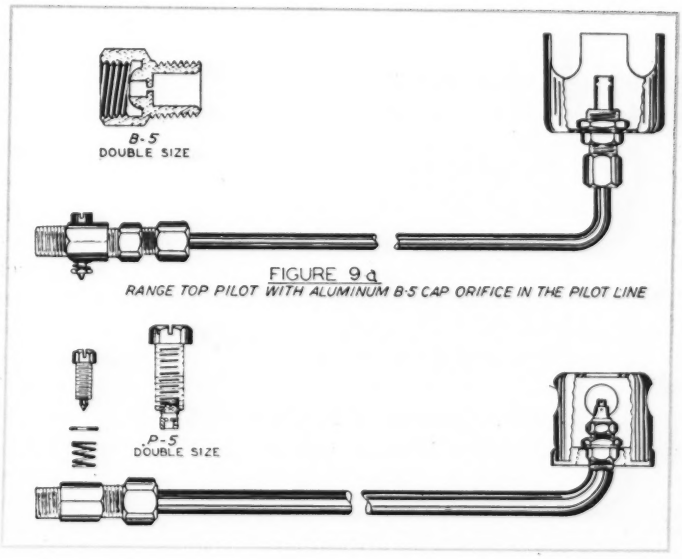


Fig. 7. (at left) "old style" Grayson Model WS2 automatic pilot in which outages resulted from small gas-way. Fig. 8, below, shows range top pilot with aluminum B-5 cap orifice in the pilot line and pilot with aluminum P-5 replacement needle.

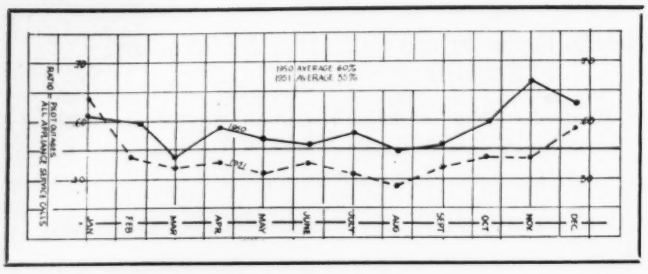


Fig. 9. Outage calls in percentage of total customer appliance service calls.

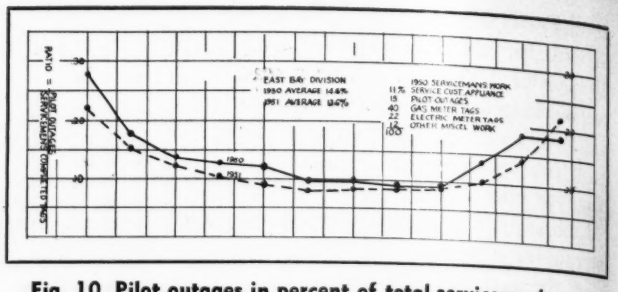


Fig. 10. Pilot outages in percent of total serviceman's completed tags.

can increase the orifice .002 to .003 diameter as he finds it to be necessary.. The broach is made of tough piano wire sharpened to a fine point. This material is superior to steel pins in that the small thin point will not break. If it becomes bent it can easily be straightened by revolving the point in contact with a smooth, hard surface.

Plastic compartment boxes, pocket size, are being used satisfactorily as a means of carrying and identifying the aluminum orifices. The 8-in. x 4-in. x 1¼-in. transparent box has 12 compartments and a hinged lid. On the inside of the lid over each respective compartment is an orifice letter and number identification. With each compartment containing two or more dissimilar orifices, the box has ample capacity to provide each man with a complete orifice selection. To identify similar orifices having different drillings such as a P-5 and a P-9, a simple color code is used.

All the research work in designing the many orifices was done in a company machine shop. Many of the more common ones are now made by outside shops. However, the actual drilling of the "gas-way" in all orifices is under the personal supervision of a company machinist in a company shop. This is believed advisable to assure a uniform and correct size drilling.

Fig. 5 shows detail of replacement of the original solid brass needle in the Domestic Model HT-1 thermostat with an M-13 aluminum needle. Occasionally, because of the installed position of the heater, it is not possible to reach the needle with a screw driver. In that event a cap orifice (C) is used.

Fig. 6 is similar to *Fig. 5* and shows the location of the L-13 needle or the G-12 cap orifice, used as the case may require.

Fig. 7 shows a Grayson WS-2 "old style" automatic pilot. Many outages result from a small gas-way at (B). Its operation is as follows: Gas flow to the WS-2 pilot is from the thermostat Model WCT, *Fig. 6*, through an L-13 aluminum orifice, then through pilot line (A) through the enlarged drilling (B) and up through the annular area between the rod (C) and the outer tube (D) and to the pilot head (E).

The original "very small drilling" at (B), not shown, was readily plugged with dust and a blue "residue" deposit (probably sulfide of copper) and was the cause of a large number of pilot outages. It has been not uncommon to relight this type pilot on an average of once a month.

To correct the trouble a larger hole (No. 36 MTD) is drilled (F) and (B). Hole (F) is then tapped and permanently plugged.

Fig. 8 is included to show range top lighters and the installation of fixed orifices. *Fig. 8* (a) shows a "B-5" cap orifice used in conjunction with a pilot plug valve. *Fig. 8* (b) shows replacement of the original solid needle with a "P-5" needle orifice.

Evaluation

The installation of fixed orifices to remedy pilot outages has been confined mostly to one company area in which pilot outages, as shown on *Fig. 9*, were, in 1950, 60% of all customer service calls, and *Fig. 10*, 14.6% of all servicemen's work. The area studied contains about 130,000 gas meters supplying an average of three gas appliances to a meter, or possibly 400,000 gas pilots. To date about 6000 of these, or only 2%, have been fitted with aluminum orifices. By this analysis one would reason it is too early in the experiment to attempt any conclusion as to its effectiveness. Looking at it in another way, however, in 1950 34,000 pilot outage calls were received from the 400,000 existing pilots. It is a confirmed fact that many of these pilot outages were "chronic" or recurring. On this basis, 6000/34,000=18% of the troublesome pilots have been fitted with orifices. Orifices have been installed only on those pilots for which outages have been reported.

To determine the effectiveness of the fixed orifices, a sample study of recent outages from installed orifices was made. For each customer's address where one or more aluminum orifices were installed, a pilot tag was completed by the serviceman. Of the 6000 tags completed, 267 covering 300 orifices installed prior to July 1951 were selected. All completed pilot outage calls at the 267 addresses were pulled from the permanent files for the two fiscal years 1949-50 and 1950-51. Care in analyzing these outage tags resulted in only the outages being counted which had occurred on those particular appliances for the two years prior to orifice installation. The same procedure was then followed in February 1952 to determine outages occurring after orifices had been installed.

Sixty-four of the 300 orifices installed were placed in pilots from which four or more outages had occurred in the past two years. These 64 were pilots classified as "chronic outages" and were selected for a follow-up study to determine the advantage, if any, in fixed orifices.

The results are shown in *Table 1*.

Of the 64 orifices installed in pilots, from which 329 pilot outages occurred in two years prior to orifice installation, 50 or 78% of the pilots required no servicing during the winter following the orifice installation. The 64 orifices are all in a low-pressure distribution area which has long been known to contain dust. Over 2000 additional orifices have been installed during the past winter which are not included in this study. It is expected next winter will show a continued "outage" improvement with a much greater number of orifices installed.

The installation of aluminum orifices to remedy pilot outages caused by dust stoppage is still in the experimental state. In our company eight servicemen in one division of the company, covering routes in which dust areas are known to exist, have so far done the installing. It is now felt from the results obtained that a stepped-up program is justified in 1952.

Fig. 1. Meter with top removed exposing the bellows and coupling mechanism.

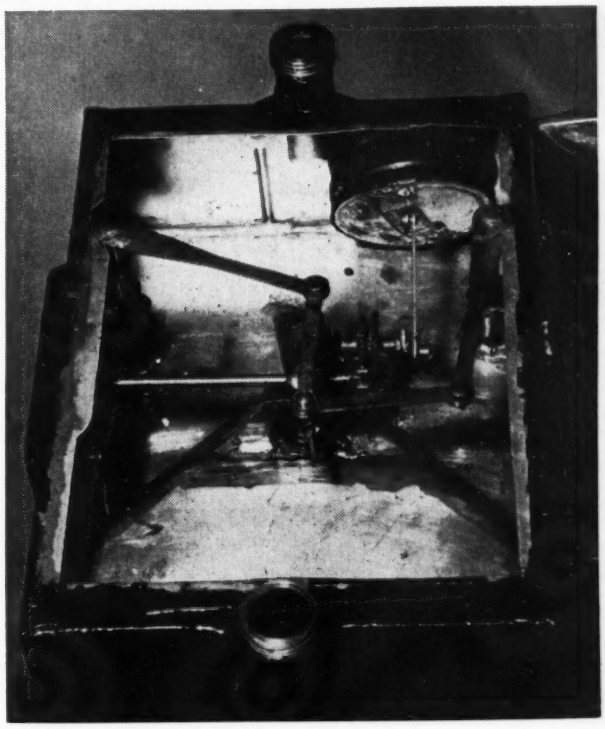
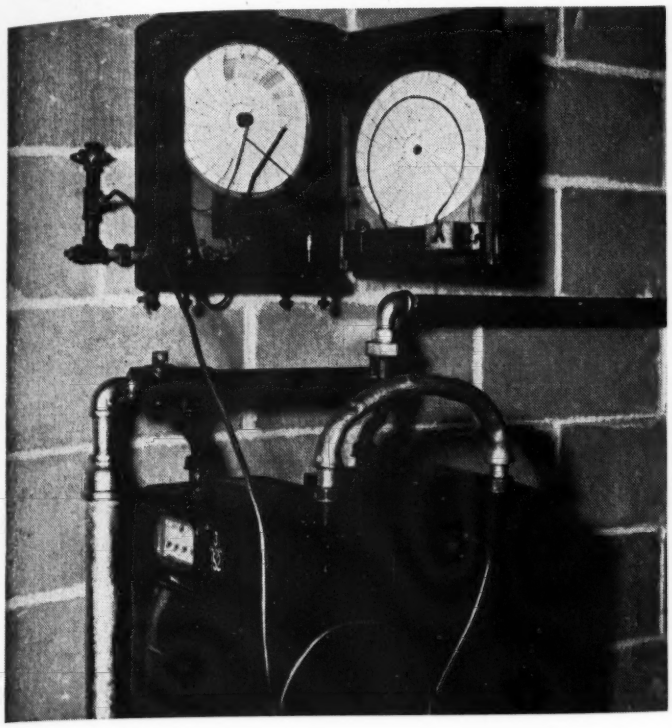


Fig. 2. A simple method of installing the meter so that no extra meter reading and billing corrections are required.



Recorder-Bellows Device Measures Maximum Demand

By H. T. LIBBY
B.C. Electric Co., Ltd.
Vancouver, B.C.

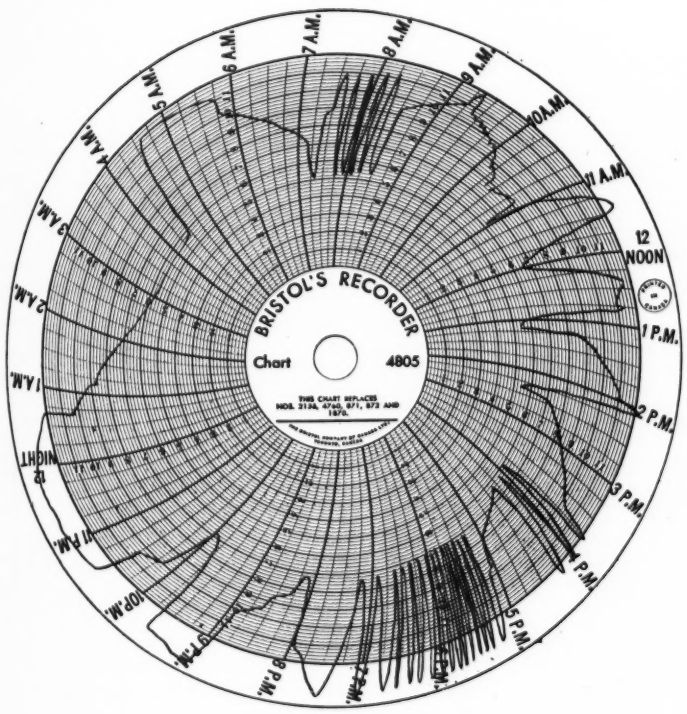


Fig. 3. Chart from small apartment building with load of 1110 cu ft/hr. Each pressure peak represents 8 cu ft of gas. Maximum hourly demand, between 5:15 and 6 p.m., is about 85 cu ft/hr.

IT is self-evident to the distribution man that there are a number of occasions when it is desirable to know the ratio of maximum demand to connected load. Besides being almost a necessity in rate setting, this information is extremely useful in establishing most economical meter and pipe sizes. The following arrangement for obtaining this information has the advantage of being completely reliable and extremely cheap to construct, and it can be assembled from materials found around even the smallest gas company:

The idea is simplicity itself. The recording is done on any low pressure recorder. The instrument is connected to small bellows installed in the top chamber of an ordinary meter. The bellows are coupled to the meter mechanism through a suitable gear and crank arrangement so that each cycle of the bellows represents a predetermined number of cubic feet of gas. This may be arbitrarily set at 10 ft for 5 lt. meters, and so on up. It is advisable to set the hand of the recorder to a point near the edge of the chart at zero gauge pressure so that the bellows are working at a fraction of an inch above and below atmospheric pressure. In this way tiny leaks in the bellows or recorder lines will not cause the pen to drift.

We have given the device a thorough work-out and have been very gratified with the results.

Denver Adopts An Incinerator Installation Code

The Rocky Mountain Gas Assn., a group including wholesalers, retailers, manufacturers, and utilities, is pressing a strong sales campaign on gas fired incinerators. This code, drawn up by an RMGA committee and recently adopted by the Denver building department, may guide other utilities in promulgating similar ordinances.

The following regulations shall be adhered to concerning free standing incinerators. By authority of Ordinance No. 32, Sections 305-306, Series of 1935 as amended, of the Denver Building Code:

Section 3715. Incinerators. Incinerators within or attached to a building shall meet the minimum construction requirements of fireplaces, except as otherwise provided in this code. Such incinerators with horizontal areas in excess of fifteen square feet (15 sq ft) shall have walls not less than twelve inches (12 in.) thick.

Chimneys for such incinerators shall be constructed as required in this chapter and shall have an approved spark arrester over the top thereof.

Section 3716. Free Standing Incinerators

(a) *Accessibility* — Sufficient clearance to permit ready access and servicing of unit shall be provided.

(b) *Air—For Combustion and Ventilation*

1. Sufficient air for combustion and ventilation must be supplied to the area in which incinerator is installed.
2. When incinerator, not to exceed 4-bushel capacity, is installed in a confined area and when air is supplied from ventilated adjacent areas to the room housing the incinerator, two openings, one near floor and one near ceiling, each with a minimum free area of 100 sq in. shall be provided in the room door or walls.
3. When adjacent areas do not have sufficient air infiltration, air shall be supplied from outdoors directly to room housing incinerator through opening or openings with a total net free area of 100 sq in. for incinerators not to exceed 4-bushel capacity.

(c) *Chimneys and Vents* — Incinerators shall be directly vented, and only to a Type "A" or other approved chimney, and through vent pipe of not less than 24 U. S. Standard gauge iron with joints and supports complying with other provisions of this code. Shelf or bracket type chimneys are prohibited.

(d) *Chimney Connection*—Vent pipe from an incinerator shall enter the chimney below the lowest connection from any other gas fired appliance to chimney.

(e) *Cleanout*—A cleanout of not less than 6 in. in its smallest dimension, tightly sealed but readily removable and accessible, shall be provided in the chimney venting an incinerator and the top of such cleanout shall be not less than 12 in. below the bottom of the incinerator vent pipe connection to the chimney.

(f) *Clearance*—Incinerators free standing, not lined with fire clay, and having a capacity rating not in excess of four (4) bushels, shall have a clearance to woodwork or other combustible material of, not less than 12 in. at sides and rear, not less than 30 in. at front, 36 in. above, and not less than 18 in. from the vent pipe thereof.

Exceptions:

1. Incinerators approved for installation with lesser clearance than herein specified may be installed in accordance with the conditions of such approval.
2. Incinerators may be installed with side and rear clearances to woodwork or other combustible material as shown in the following table if such woodwork or material is protected in conformity with this table.

Type of Protection	Required clearance without protection is:	
Applied to combustible material and covering all surfaces within the distance specified as the required clearance.	18 in. *Vent Pipe*	12 in. *Sides and Rear*
¼-in. asbestos millboard spaced out 1 in.*	12 in.	6 in.
28 gauge galvanized sheet metal on ¼-in. asbestos millboard	12 in.	6 in.
28 gauge sheet metal on ⅛-in. asbestos millboard spaced out 1 in.*	9 in.	4 in.

*Spacers shall be of noncombustible material and the air space shall be ventilated.

3. No clearance required at sides and back of vent to masonry construction of 4 in. or more thickness.

(g) *Draft Hoods, Prohibited*—The use of draft hood as defined in Section 5101, (j) 1., is prohibited.

(h) *Floors*—Incinerators of the type in paragraph (a) shall be mounted or set on masonry floors.

Exception:

1. Incinerators approved for installation on combustible floors may be installed in accordance with the conditions of such approval, provided, however, that such floors be covered with sheet metal of not less than 24 U. S. gauge, and extending at the sides and back not less than the required clearance to combustible material and extending not less than 30 in. beyond the front.

(i) *Locations, Prohibited*—See Prohibited Locations.

(j) *Other Incinerators*—Incinerators in excess of 4-bushel capacity and not of the free standing type are covered by other sections of this code and shall be subject to approval of Chief Building Inspector.

(k) *Piping*—All supply piping shall be not less than standard weight wrought iron or steel pipe, and sized and installed in compliance with other provisions of code.

(l) *Prohibited Locations*—Installation of incinerators in garages or in areas containing explosives or flammable liquids is expressly prohibited unless separated therefrom by not less than an "absolute separation." (See Section 503—Building Code.)

(m) *Use of Safety Thimbles*—For incinerator vent or flue connectors, the exterior diameter of the thimble shall be 12 in. diameter. (See Chapter 37—Bldg. Code.)

(n) *Vents*—See Chimneys and Vents (c).

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USES GAS ALL YEAR 'ROUND

No other equipment contributes so much to your gas load . . . no other equipment so smooths out the peaks and valleys of seasonal gas demands. For Servel is the revolutionary unit that uses heat to create both warmth and cooling . . . a truly year 'round air conditioning unit that uses only one energy source 365 days a year, GAS!

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ASSOCIATIONS

Nearly everyone's in this act. GAMA president Louis Ruthenburg, right, presents service award to Harry Gurney of Surface Combustion, while President-elect J. F. Donnelly gives him a pat on the back. Seated are past president F. O. Hess (left) and NPAdministrator H. H. Fowler. Occasion, GAMA's 17th annual convention.

GAMA Unveils "Operation Sales" at Annual Meet

"Operation Sales," a combined effort of 17 gas range manufacturers representing more than 60% of the nation's production with a goal of 5 million units per year, was announced at the conclusion of the 17th annual GAMA convention in Colorado Springs in late May.

While not replacing the "CP" program, the new campaign will be on a broader scale, bringing in members who are not now participating in the other promotion.

A promotional appeal to wives, mothers, prospective brides, and teen-agers, with provision for a complete sales-making package for dealers, is planned. Targets will include home economic teachers, 3 million students in the 12-22 age bracket, adults in night school courses, school administrators and business managers, school building architects, and others.

The drive will be aggressively merchandised to utilities and dealers, according to its sparkplug, E. Carl Sorby, head of the gas range division.

Other events on the program highlighted clarification of industry policies with respect to dealer relations, marketing, and public relations. Frank C. Smith, Houston Natural, in a talk "Memo to the Chief Executive," urged gas utilities to "pick up the year-around gas load and service to homeowners" represented in the newer appliances. GAMA President Louis Ruthenburg, pointing to five factors that promise even greater expansion of appliance sales in the immediate future, called for a revival of salesmanship.

C. E. Bennett, AGA's new president, urged gasmen to be "more concerned with where we are going than where we have been."

Henry H. Fowler, National Production Authority administrator, painted a general brighter picture of materials availability, predicting substantially relaxed controls on the materials of gas appliance and equipment manufacture.

Honors were heaped upon industry leaders for outstanding contributions. First presentation of the new distinguished service award "for promotion and advancement of industrial gas utilization" was made to F. O. Hess, ex-GAMA president and head of Selas Corp. Seventeen men were given meritorious service awards to division chairmen.

A graphic representation of the first year's accomplishments in the association's public relations program was given by Gerry Swinehart, president of the public relations counselors, Carl Byoir & Associates.

International Meet Held

R. W. Hendee

At the 5th international gas conference held at Brussels, Belgium, June 16-19, Robert W. Hendee, president, Colorado Interstate Gas Co., Colorado Springs, and former president of the AGA, was elected president of the International Gas Union. Mr. Hendee's election for a three-year term marks the first time an American gas executive has been chosen to head the international organization in its 20-year history.

The AGA, U. S. representative in the union, was represented by Speakers Charles E. Bennett, AGA president and head of the Manufacturers Light & Heat Co., Pittsburgh, and H. Carl Wolf, AGA managing director.

Service Personnel Attend Short Course at Tulsa

Supervisors and service appliance personnel, numbering 153 from 19 states, attended the 7th annual short course in gas appliances at the University of Tulsa, May 26-28. Robert R. Suttle, managing director of the Southern Gas Assn., addressed the first general meeting. Other principal speakers included L. V. Cochat, AGA Laboratories, speaking on "The Serviceman's Connection With the AGA Laboratory," and Oakah L. Jones, Tulsa district manager of the Oklahoma Natural Gas Co., speaking on "The Employee in Private Enterprise."

Six classes were given on automatic controls, representing Robertshaw-Fulton, Minneapolis-Honeywell, General Controls, White-Rodgers, Perfex, and Detroit Lubricator. Gas clothes dryers, featuring Hamilton, Whirlpool, and Bendix, were discussed at three sessions. Other subjects presented included: gas fundamentals, principles of proper venting, servicing automatic ignition on domestic gas ranges, service calls on high bill complaints, an explanation of why gas is best for cooking, basic electricity for the gas serviceman, servicing commercial water heating equipment, and a service supervisors' roundtable.

Oates Named AGA Director

J. F. Oates

James F. Oates Jr., chairman and chief executive officer of The Peoples Gas Light & Coke Co., Chicago, has been elected a director of the American Gas Assn., filling the unexpired term of Frank C. Smith, president of Houston Natural Gas Corp. Mr. Smith was recently elected a vice president of the AGA, replacing the new president, C. E. Bennett.

Active in industry affairs, Mr. Oates is vice chairman of the PAR committee and a member of the board of trustees of the Institute of Gas Technology. He also serves as chairman of the board and a director of Natural Gas Pipeline Co. of America, Texas Illinois Natural Gas Pipeline Co., Natural Gas Storage Co. of Illinois, Texoma Production Co., and Chicago District Pipeline Co.

Pennsylvanians Elect Jones

Nearly 500 men connected with the manufactured and natural gas industries gathered in Galen Hall in Wernerville, Pa. May 13-15 for a meeting of the Pennsylvania Gas Assn. W. E. L. Irwin, district manager of the Philadelphia Electric Co. at Ardmore, was succeeded as president by Gordon M. Jones, sales manager of the United Gas Improvement Co., Philadelphia.

Other officers elected: Andrews S. Morgan, Lancaster (Pa.) County Gas Co., 1st vice president; J. Henry Long, Philadelphia Electric Co., 2nd vice president; John A. Frick, Allentown-Bethlehem Gas Co., 3rd vice president; R. W. Uhler, Lebanon Valley Gas Co., secretary; and James A. Schultz, Reading Gas Co., re-elected treasurer.

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National Advertising Campaign Includes

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The 1952 Garland campaign is selected and directed to reach not only the *largest potential market*—but also the *major buying influences* within each market! Garland advertising delivers you more "ready-to-buy" customers because Garland pin-points prospects with an exclusive story of value, prestige and dependability that is unequalled!

Yes, again in 1952 as in previous years, Garland leads the field with more down-to-earth selling support for its dealers, and for the gas industry. First in advertising, as in acceptance, performance and profit possibilities.

Sell Garland, the line that pre-sells more "ready-to-buy" customers! Sell the Line of the Leader!

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Personnel Group Studies College Grad Shortage

A report on the effect of the decreasing supply of college graduates to serve the gas industry, particularly in engineering departments, will be available soon in a survey made by the AGA personnel committee, it was reported at the committee's conference held in Chicago in May. The survey is being made of companies employing about 44% of the total number of industry workers, so that it should reflect a fair indication of industry conditions.

J. J. Solon, The Peoples Gas Light & Coke Co., Chicago, chairman of the Great Lakes personnel conference, was chairman of the joint meeting which included the personnel committee and the AGA Midwest personnel conference. Thirty-six industry personnel executives attended the conference.

In addressing the group, Dwight S. Sargent, Consolidated Edison Co. of New York, said that while he believes the shortage problem can be helped by companies individually, the personnel committee hopes to promote industry-wide action after its survey is completed. Group supervision, aptitude tests, round-table reports, and a discussion of company developments including contract negotiations rounded out the meeting.

Research men at Cleveland included H. A. Clark, Mich Con; Leon Ourusoff, Washington Gas Light (chairman); H. W. Geyer, Robertshaw-Fulton.

Research Speedup Needed, Utilization Men Told

When enough "pressure is exerted," the notorious "10-year lapse between the release of a research bulletin and the initial stage of marketing can be drastically reduced," Leon Ourusoff of Washington declared in a strong keynote speech at the seventh annual AGA research and utilization conference in Cleveland last month.

"Research always stems from dissatisfaction," said Mr. Ourusoff. He cited the commercial research project on deep fat fryers as an example of the speed with which a product can be marketed if a dissatisfied industry is sufficiently determined to push through quickly to the solution of a problem.

H. Carl Wolf, managing director of AGA, echoed this sentiment when, in an address read in his absence by T. L. Robey, research coordinator, he said, "In the field of research the big problem has been, is, and probably for some time will continue to be, how to shorten the time and distance between the research laboratory and the consumer's kitchen."

Mr. Wolf also decried the limited scope of gas-burning appliances, reminding the 350 listeners that an industry competitor gloats about the thousand uses of his product, "but in his kitchen range he is limited to five heats; here we are, an industry with 1000 heats, and yet we are limited with home appliances to seven uses."

Most of the important phases of gas industry utilization research were touched

At the research and utilization conference, speakers were Keith Davis, Bryant Heater; E. F. Hart, Boston Consolidated; W. M. Myler Jr., Surface Combustion Corp.

USE UNTRAINED LABOR

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One man can assemble and make up Boltite mechanical joints. He needs no special skill or training. He needs only one tool—a ratchet wrench. All he does is socket the spigot in the bell, slip the gasket into the stuffing box thus formed, then tighten the bolts of the follower-ring or gland. This simple procedure in joint making saves time, saves labor, saves money.

Boltite is an ideal mechanical joint for water or gas, steam, oil, chemicals or other liquids. Gaskets are furnished of materials to suit the service required. Boltite joint parts are interchangeable with any make of Standardized Mechanical Joint for Cast Iron Pipe. For further details, write

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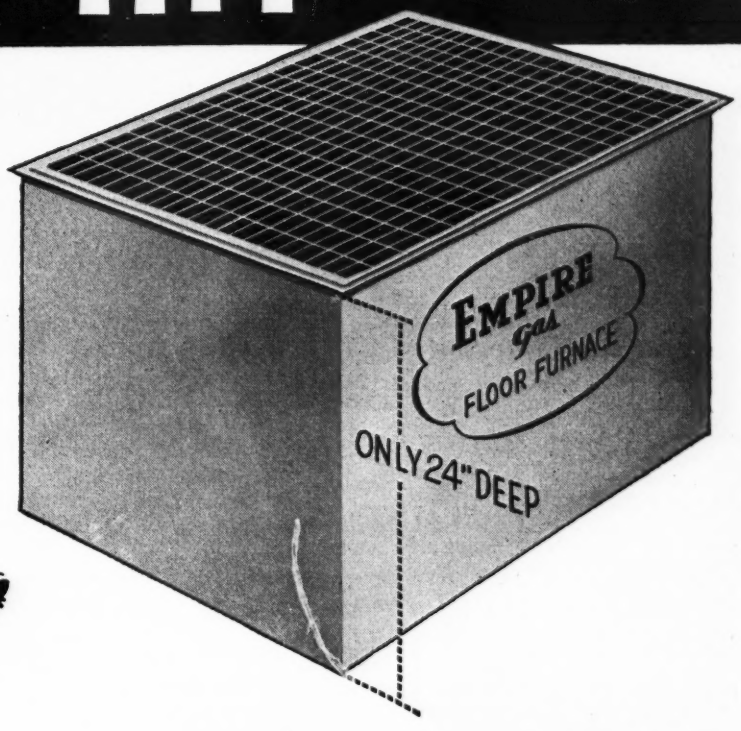

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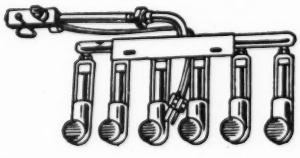

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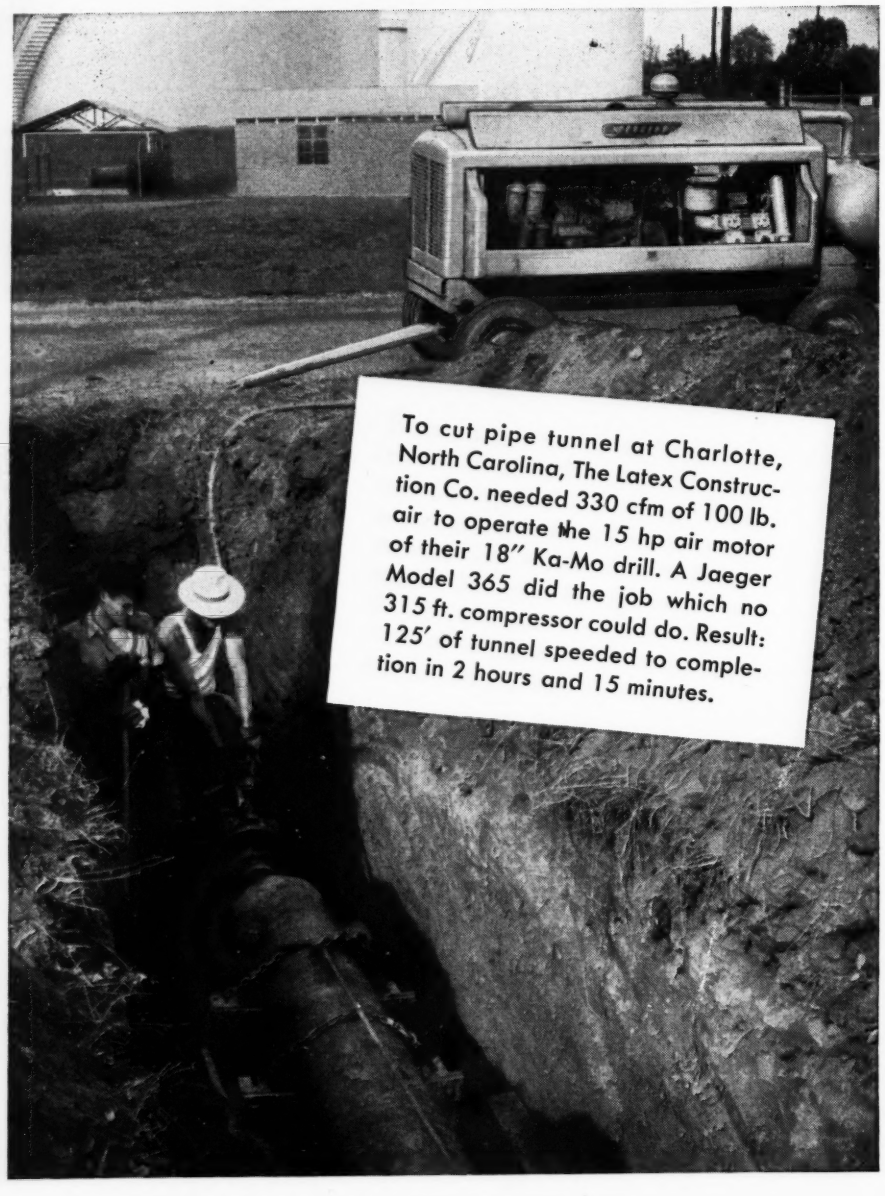
WORLD'S LARGEST MANUFACTURER OF *Gas* FLOOR FURNACES

Air-starved tools get up and go with Jaeger "air plus" pressure


To cut pipe tunnel at Charlotte, North Carolina, The Latex Construction Co. needed 330 cfm of 100 lb. air to operate the 15 hp air motor of their 18" Ka-Mo drill. A Jaeger Model 365 did the job which no 315 ft. compressor could do. Result: 125' of tunnel speeded to completion in 2 hours and 15 minutes.

To operate every type of air tool at full pressure and efficiency, Jaeger "Air Plus" Compressors give you 15% to 25% more air than any comparable "old-standard" units, and supply this air at lowest cost per cubic foot of any compressors on the market. Jaeger "new standard" ratings are 75 ft. of 100 lb. air instead of 60—125 ft. instead of 105—185 ft. instead of 160—250 ft. instead of 210—365 ft. instead of 315—600 ft. instead of 500—to match today's tools.

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upon in the two-day session. An innovation was the series of independent panel discussions on cooking, water heating, heating and air conditioning, and general utilization research. Also featured was a clinic on the role of gas company laboratories in the overall gas industry picture.

Keith Davis, Bryant Heater Division, in his paper on venting, called for a re-examination of the "physical laws pertaining to venting to determine under what circumstances the present rule-of-thumb design standards do not provide adequate safety factors." A deeper basic knowledge of venting system performance should be provided in contemporary research.

Ralph E. Cramer of the AGA Laboratories also devoted considerable discussion to venting in his talk on appliance installations. He cited the present trend to flush-to-wall installation and confined spaces as contributing toward making appliance servicing more troublesome and difficult.

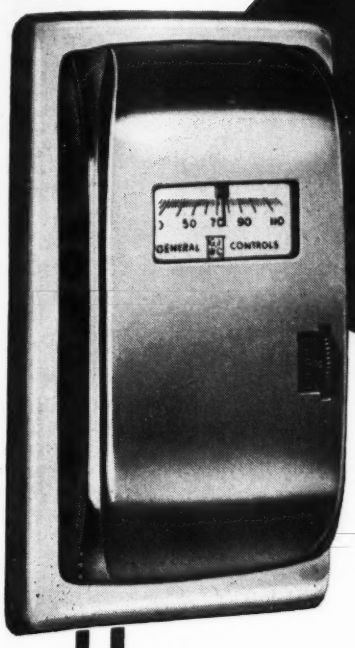
Mr. Cramer also spoke of requirements to cover the installation of conversion burners in coal ranges, now being prepared.

Further research is needed to solve the intricacies of multi-story venting, E. F. Hart of Boston Consolidated declared. He described representative installations and methods recommended for solving problems inherent in their designs.

"Most of the important troubles have been or will be eliminated by the manufacturers now that they are known," said E. A. Jahn, reporting on the range ignition program, "two-thirds of the field reports received indicated no complaint or trouble." Through Dec. 31, 1950, 1001 ranges had been involved in the field tests.

Eugene D. Milener of the AGA, in recognition of his 22 years of service in utilization research, was presented a watch and humidor by H. A. Clark, Michigan Consolidated Gas Co., chairman of the AGA committee on industrial and commercial gas research.

Part of the traveling exhibit "Industrial Progress, USA," this American Radiator & Standard Sanitary Corp. display of an antique bed warmer emphasizes the contributions of the heating and plumbing industry to the nation's health and comfort. The exhibit, to visit cities of over 100,000 population during the next three years, is sponsored by 20 manufacturers in cooperation with Henry Ford Museum.



"FIRST"

BX-69

GAS HEATING PACKAGE SET

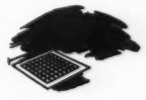
the original self-generating all gas control system

BX-69 is a variation of a famous gas industry "First," the sensational B-60 All Gas Control System *originated and developed by General Controls*. Remote thermostatic control of the system is provided, *yet no outside electrical current is required*. Positive safety shut-off, completely safe low voltage wiring, accurate temperature control, silent operation combine in the BX-69 to make it the best control system for gas-fired heating appliances. A General Controls "First," the BX-69 is just another reason why we can say with confidence that for the best in automatic controls it's General Controls.

SILENT
ACCURATE
LOW COST
AUTOMATIC
CONTROL
FOR ALL
GAS-FIRED
HEATING APPLIANCES

CIRCULATORS — BX-69 is easily adaptable for remote control of circulators.

CENTRAL WARM AIR HEATING — Quiet operation for central or blower furnaces.



FLOOR FURNACES — Provides quiet operation, remote control for floor furnaces.

GAS RANGES — Desirable for gas ranges equipped with heaters.

GAS RADIATORS — Readily controlled by BX-69.

WALL HEATERS — BX-69 is easily installed in wall heaters.

GAS FIRED BOILERS — Simplicity and lower cost recommends BX-69.

COMMERCIAL & INDUSTRIAL OVENS — BX-69 is ideal where external electric circuits not provided or desired.

GENERAL CONTROLS

801 Allen Avenue Glendale 1, Calif.

Manufacturers of Automatic Pressure, Temperature, Level and Flow Controls

FACTORY BRANCHES: Baltimore 5, Birmingham 3, Boston 16, Buffalo 3, Chicago 5, Cleveland 15, Columbus 15, Dallas 2, Denver 4, Detroit 21, El Paso, Glendale 1, Hartford, Houston 6, Indianapolis 4; Kansas City 2, Milwaukee 3, Minneapolis 2, Newark 6, New Orleans 16, New York 17, Omaha 2, Philadelphia 23, Pittsburgh 22, Sacramento 14, St. Louis 3, San Francisco 7, Seattle 9, Toronto (Canada), Tulsa 6, Washington 6.

DISTRIBUTORS IN PRINCIPAL CITIES

CUT COSTS
ON UNDERGROUND
PIPING JOBS

...with a GREENLEE PIPE PUSHER

Installing pipe underground is quick and simple this way. With a GREENLEE Hydraulic Pipe Pusher *one man* pushes pipe through the ground—under streets, railways, walks, lawns, floors. Saves time, cuts costs through elimination of extensive ditching as just a short trench accommodates the Pusher. No tearing up of pavement, lawns, floors . . . eliminates tunneling, back-filling, tamping, repaving. Cuts job time to a fraction. Pusher often pays for itself through timesavings on first job or two.

No. 790 GREENLEE PUSHER For 3/4 to 4-inch pipe. Six speeds—5,600 to 40,000 lbs. pushing pressure.

No. 795 GREENLEE PUSHER For pipe larger than 4-inch, concrete sewer pipe, large drainage ducts. Six speeds—25,000 to 150,000 lbs. pushing pressure.

POWER PUMP For both sizes of GREENLEE Pushers. Pushes pipe at rate of two feet per minute.

TOOLS FOR CRAFTSMEN
GREENLEE

Get facts on timesaving Greenlee tools now. Write Greenlee Tool Co., Division of Greenlee Bros. & Co., 1947 Columbia Avenue, Rockford, Illinois, U. S. A.

Officials of the 1952 Southwestern Gas Measurement short course are shown, seated, left to right: T. S. Whitis, West Texas Gas Co., program chairman; W. H. Carson, U. of Oklahoma, local arrangements; Miss Kate A. Niblack, Oklahoma Utilities Assn., registration and publicity; James L. Griffin, Northern Natural Gas, general chairman. Standing, left to right: K. R. Tibbets, Warren Petroleum, publications; W. A. Griffin, Daniel Orifice Fitting Co., exhibitors advisory committee; R. O. Cox, Lone Star Gas, committee for study of practical methods; Roy S. Peace Jr., Southern Natural, exhibits.

Measurement Short Course Has Record Attendance

A record attendance of 1034 from 34 states and two foreign countries, Canada and Mexico, was set at the 27th annual Southwestern Gas Measurement short course held on the North Campus of the University of Oklahoma, Norman, on May 27-29.

Twenty-nine manufacturers of gas and oil equipment found plenty of space for their exhibits, which were educational in nature. These manufacturers, along with gas utilities and the university college of engineering furnished the 80 special instructors, each one an expert in some line of gas regulation and measurement.

The course was formally opened by General Chairman James L. Griffin, Northern Natural Gas Co., Omaha. The principal address of the three-day school was delivered by J. Merriam, president of Northern Natural.

The dates for the 1953 short course, April 21-23, were confirmed, according to Miss Kate A. Niblack, chairman of the publicity and registration committee.

Chairman Griffin was promoted to the executive committee, of which Dean W. H. Carson is chairman. The executive committee appointed T. S. Whitis, West Texas Gas chairman of the general committee for the 1953 course.

Biggest PCGA Meeting Expected in September

New attendance records will be established at the Pacific Coast Gas Assn. convention, scheduled for Sept. 3-5 at the Ambassador hotel in Los Angeles, it is predicted by Clifford Johnstone, managing director of the association. The program for the 59th annual meeting, now being planned by program committee chairman F. M. Banks, Southern California Gas Co. president, will be focused on a subject of critical importance—merchandising. Acceptances have already been received from several outstanding authorities in this field.

According to tentative plans, the first event of the convention will be the annual meeting of the manufacturers section on Wednesday morning, Sept. 3. F. S. Wade, chairman of the board of SoCal, will preside at luncheon in the Cocoanut Grove, where PCGA President W. M. Jacobs will make his address. Committee reports and addresses by Frank Smith, AGA vice president, and Louis Ruthenburg, GAMA president, will be heard Wednesday afternoon.

Anne Whipple, home economist, Seattle Gas Co., will preside at the home service breakfast scheduled for Thursday morning. At the general session, merchandising and selling in the present day market will be discussed. Problems connected with rate making, service, and customer relations will feature the afternoon program. The final general session on Friday morning will be devoted to sales and personnel problems.

Frank Wright of Southern Counties Gas Co., Los Angeles, is general chairman for arrangements. R. D. MacMahan is chairman of the housing committee.

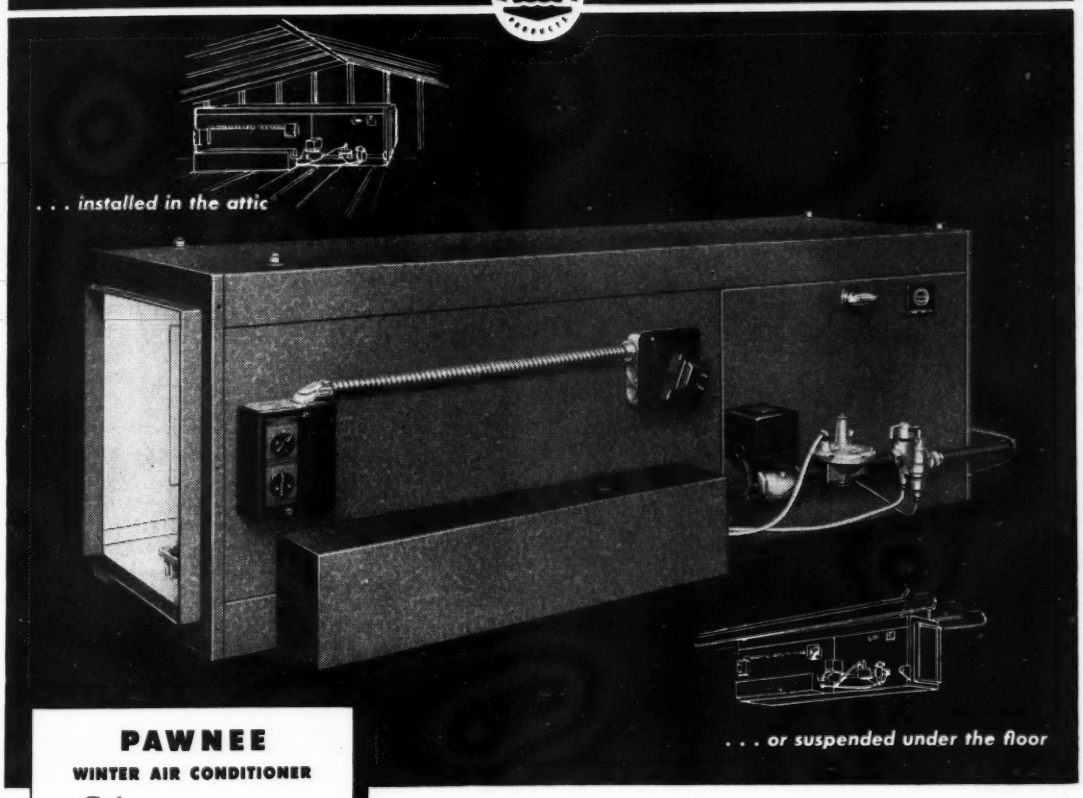
Air Conditioning Awards

Three gas utilities which, in the opinion of the judges, made the most outstanding contributions to the progress of gas summer air conditioning during the period of Aug. 31, 1951 to Aug. 31, 1952 will receive cash prizes and distinctive trophies at the AGA convention in October. This, the 5th annual progress award competition, is sponsored by Servel.

Cash prizes of $500, $300, and $200 will be given in the contest, which is designed to stimulate industry-wide knowledge and appreciation of the fast-growing gas summer air conditioning field. Entries may be based on any activity relating to sales or installation such as sales planning, application engineering, product improvement, sales promotion and advertising, organization development, etc. Judges are from the AGA, GAMA, ASHVE, and from the education and gas and building trade publication fields.

Every AMERICAN-Standard gas-fired heating unit installed along your mains means more load for you . . . and another satisfied gas customer!

AMERICAN-Standard



PAWNEE
WINTER AIR CONDITIONER
Another example of
AMERICAN-Standard
Leadership

● If yours is a small house, or if you are a builder or an architect, the Pawnee offers a welcome solution to your heating problems.

Designed especially for low cost installations in homes where limited floor space makes it difficult or undesirable to install conventional winter air conditioners, this new gas fired horizontal unit may be just what you need.

The Pawnee's compact size and quality construction permits safe installation in attics, under floors, or suspended from the ceiling of basements, closets, utility rooms, or similar out-of-the-way locations.

The new Pawnee is also perfect for zone heating in larger single floor homes where more than one winter air conditioner can be employed to advantage.

Made in four sizes: 40,000, 60,000, 80,000 and 100,000 Btu input per hour, the Pawnee operates efficiently with natural, manufactured, mixed, and liquefied petroleum gas. Completely factory assembled and wired, it is easy to handle and can be installed quickly and economically in both new construction and modernization jobs.

With the addition of the Pawnee winter air conditioner to its already extensive warm air line, American-Standard further strengthens its leadership as "First in heating—first in plumbing."

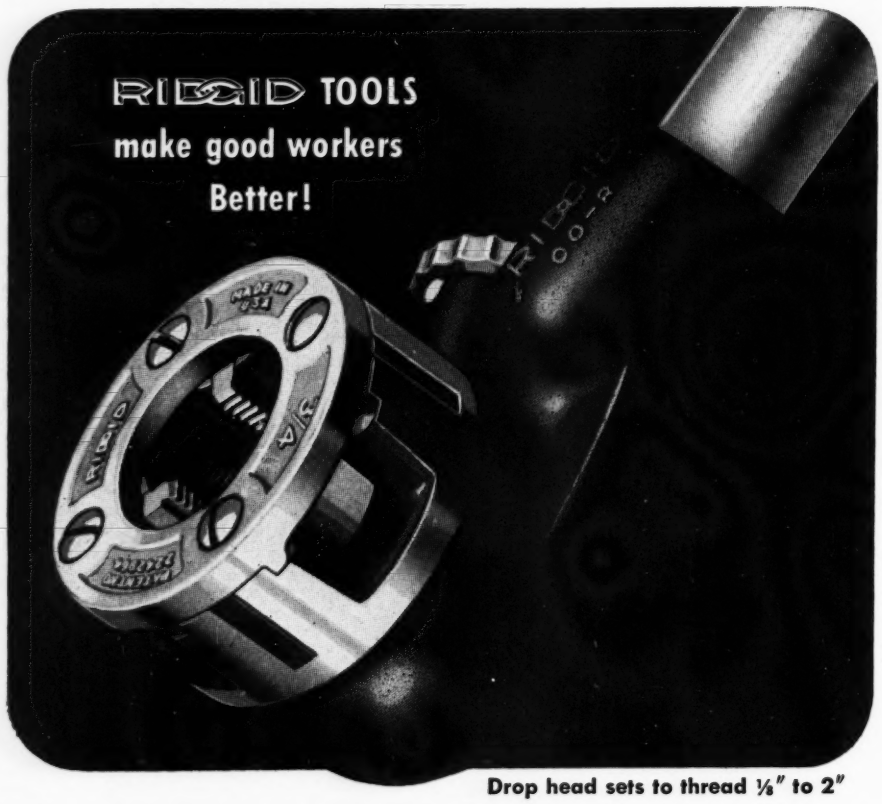
American Radiator & Standard Sanitary Corporation, Dept. US-62, Pittsburgh 30, Pa.

Serving home and industry

AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

This ad announcing the newest American-Standard gas fired unit appeared in the May 31 issue of Business Week and June 13 issue of U. S. News.

WHY SKILLED WORKMEN Prefer RIDGID Small Ratchet Threaders



Drop head sets to thread ⅛" to 2"

These Drop Head Dies Give You *Extra* Fast Easy Pipe Threading

- ★ Heads snap into ratchet ring from either side, won't fall out.
- ★ Precision-cut alloy dies reverse for close-to-wall threads—no special dies needed.
- ★ 00R & 0R, ⅛" to 1"; 111R and 11R, ⅛" to 1¼"; 12R, ⅛" to 2". Conduit dies available.
- ★ Buy at your Supply House.

THE RIDGE TOOL COMPANY • ELYRIA, OHIO

RIDGID Work-Saver Pipe Tools

NEWS

Financial

FPC Turns Down Five Rate Boost Requests

Four suspensions and one rejection of proposed wholesale natural gas rate increases, totaling more than $50 million per year, were recorded by the FPC on increases that would have gone into effect June 1. Proposed increases suspended were Texas Eastern Transmission, Shreveport, $41,800,000; Ohio Fuel Gas, Columbus, $2,200,000; Manufacturers Light & Heat, Pittsburgh, $2,200,000; and Home Gas, also of Pittsburgh, $1,242,000. Also dismissed late in May was Transcontinental Gas Pipe Line Corp.'s proposed $13,600,000 increase.

In rejecting Mississippi River Fuel Corp.'s proposal for a $3,300,000 raise, the commission pointed out that the St. Louis company based about one-third of the hike on the assumption that United Gas Pipe Line Co., its supplier, would ask for an increase. Such a request, however, had not been filed with FPC at the time of the dismissal, although on June 4 United Gas did ask for an $8,400,000 boost.

Among the larger rate increases asked during the month was Texas Gas Transmission's plea for approximately $12,480,000. Others included United Natural Gas Co., Oil City, Pa., seeking $1,200,000, and Peoples Gas Light & Coke Co., Chicago, asking for a $6 million increase.

Approvals received recently include one for $2,625,000 granted the Peoples Natural Gas Co., Pittsburgh. The FPC also accepted for filing natural gas rate schedules submitted by Texas Eastern Transmission Corp. covering new services authorized by the commission in February 1951 when it approved the company's plan to construct a 30-in. pipeline from Kosciusko, Miss. to the Pittsburgh, Pa. area. The new schedules became effective April 25.

First-Quarter Gains In Sales and Revenue

Gas revenues of the gas utility and pipeline industry showed an 11.1% gain, totaling $815 million, in the first quarter of 1952 over the same period in 1951. AGA reports show that revenues from industrial sales represented the highest percentage gain, 17.3%. Residential revenues were up 9.5%, and commercial gas revenues gained 11.1%.

Other first-quarter figures show gas industry sales up 9.2%, rising from 14,665 million therms to 16,017. Sales to industrial users advanced 12.7%; commercial, 10.3%; residential, although affected by mild weather, up 6.5%. At the end of March, 23.5 million residences were using gas, representing a gain of 945,000 during the past 12 months. Total customers in all classifications now number 25.5 million.

Natural gas revenues during the quarter were $649 million, a 16.5% rise. The 12-month period ending March 31 shows gas sales totaling $1,759,000,000, or 19% over the previous year. Natural gas customers

SELL WITH PROOF—No. 4 of a Series

Demonstrate COOLER COOKING

WITH ALLTROL® CENTER SIMMER

and you sell the gas range!

Use These Tested and Proved Selling Points:

1. The controlled low heat of *Alltrol Center Simmer* keeps the kitchen as much as 9° cooler . . . BY ACTUAL TEST. *Alltrol Center Simmer* sends heat directly into the cooking vessel . . . not around the sides. Heats the food . . . not the cook.

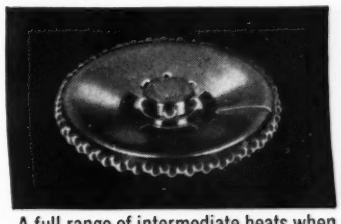
2. Gentle boiling of *Alltrol Center Simmer* releases less moisture into the air . . . keeps humidity down . . . means more kitchen comfort. Less heat is needed as less water is used.

3. *Alltrol Center Simmer stops heating as soon as turned off . . .* there's no laggard heat to overcook food or overheat the kitchen.

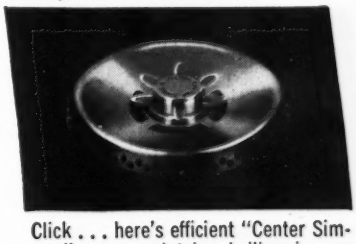
Conclusion: ALLTROL CENTER SIMMER COOKS THE FOOD . . . NOT THE COOK!

Write for names of gas ranges featuring the "ALLTROL CENTER SIMMER".

Full flame Starting Burner for quick boil or fast frying.



A full range of intermediate heats when wide spread of heat is needed.



Click . . . here's efficient "Center Simmer" . . . maintains boiling in any covered vessel.

Click . . . a gentle "Keep Warm" heat . . . without further cooking.

® Trade Mark Reg. U. S. Pat. Off.

ALLTROL® CENTER SIMMER

HARPER-WYMAN COMPANY

8562 VINCENNES AVENUE • CHICAGO 20, ILLINOIS

"ALLTROL CENTER SIMMER" *Makes Gas the Winner*

Send for this FREE Booklet "HOW TO SELL MORE GAS RANGES." Address: Dept. 72G

numbered about 17.6 million, an increase of 14%.

In therms, utility gas sales for the 12-month period ended April 30 rose to 50,353 million therms, an increase of 11.8% over 1951. Natural gas sales in March aggregated 4473 million therms; for the 12-month period ending April 30, the total was 46,937 million therms, a 12.9% gain.

FPC reports that operating revenues of natural gas companies totaled $184,901,119 in March, increasing 20% for a like period in 1951. For the 12 months ending March 31, revenues were $1,691,899,038, a 19.6% gain. Gas utility income for March amounted to $33,326,175, rising 15.7%; for the year ending in March, operating income was $259,925,974, an increase of 11.5% over the comparable period in 1951.

Jersey Central Sold To New Jersey Natural

A reversal of the usual normal procedure took place last month when the New Jersey Natural Gas Co., Atlantic Highlands, serving approximately 14,000 customers in a relatively small section of two New Jersey counties, bought the gas properties of the Jersey Central Power & Light Co., Asbury Park, bringing to its customer roster an additional 84,000 gas users in five counties.

Following receipt of FPC approval for the transaction, New Jersey Natural paid about $16 million to increase its area from 90 square miles to 950 square miles, and acquired about 38 miles of 10-in. and 29 miles of 8-in. pipelines, storage holders with a capacity of 7188 Mcf, 26 compressors totaling 64,054 Mcf per day, 1446 miles of mains, and six liquid propane plants with an output in 1951 of 3,768,975 Mcf of 625 Btu gas.

Kenneth D. Knoblock (left), New Jersey Central president, hands E. H. Werner, president of Jersey Central, a check for $16 million for Jersey Central gas properties.

Before the purchase, New Jersey Natural was receiving 3 MMcf of gas per day from Texas Eastern Transmission Corp. When the latter firm completes construction of new facilities, the company has FPC approval for purchase of an additional 2 MMcf. The purchaser takes over Jersey Central contracts with Texas Eastern, Algonquin Gas, and the South Jersey Gas Co., supplied by Transcontinental Pipe Line Corp., for almost 20 MMcf of gas per day to supply its combined service area.

New Jersey Natural, headed by Kenneth D. Knoblock as president, expects to set up new headquarters and five division offices. Formerly the County Gas Co., the expanding utility was purchased from Public Service Corp. in 1948 by Mr. Knoblock, James S. Abrams Jr. and Irving Koerner, vice presidents, and F. A. O'Neill, treasurer.

Milwaukee Gas Fears Overcharge Suits

The Milwaukee (Wis.) Gas Light Co. has appealed to the public service commission for relief on suits being brought against it as a result of alleged rate overcharges to space heating customers. The utility asked for a rehearing on a PSC order of May 14 in which the commission held that persons who had gas furnaces installed before March 12, although without proper approval, should continue to get service.

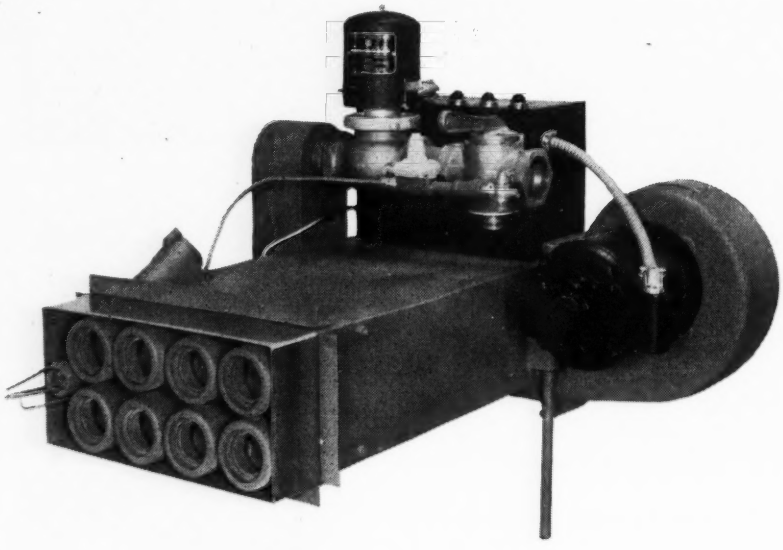
The ruling stated that no one with a gas furnace, even though unauthorized, should have been charged more than space-heating rates. The commission said it is without authority to order refunds on past bills but ordered future billings at space-heating rates.

One claim filed against Milwaukee Gas is for treble damages, based on a state statute granting customers the right to sue for treble damages for a willful overcharge by a utility. It was alleged that the company became willful after it received the first complaint and continued to charge the higher regular rates.

Milwaukee Gas President Dudley B. W.

WEBSTER DYNETIC* GAS BURNER

FORCED DRAFT



The WEBSTER DYNETIC Gas Burner consists of multiple venturi tubes with heat resistant alloy, flame retention nozzles assembled in a metal housing and equipped with an electrically driven blower to furnish all of the air for combustion.

All of the valves and controls required for safe, automatic operation, except for thermostat and limit controls, are incorporated in the assembly and wired and tested at the factory. The motor driving the blower is equipped with a centrifugal switch to prevent main gas valve operation unless the blower is functioning.

The burner is available in six sizes for natural gas.

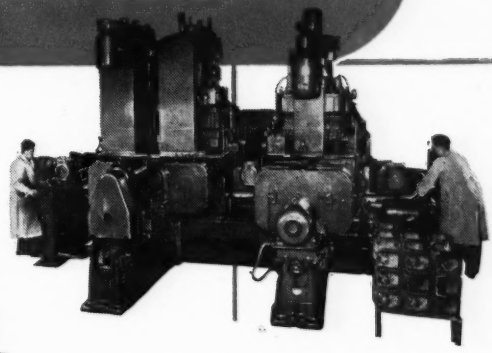
*TRADEMARK

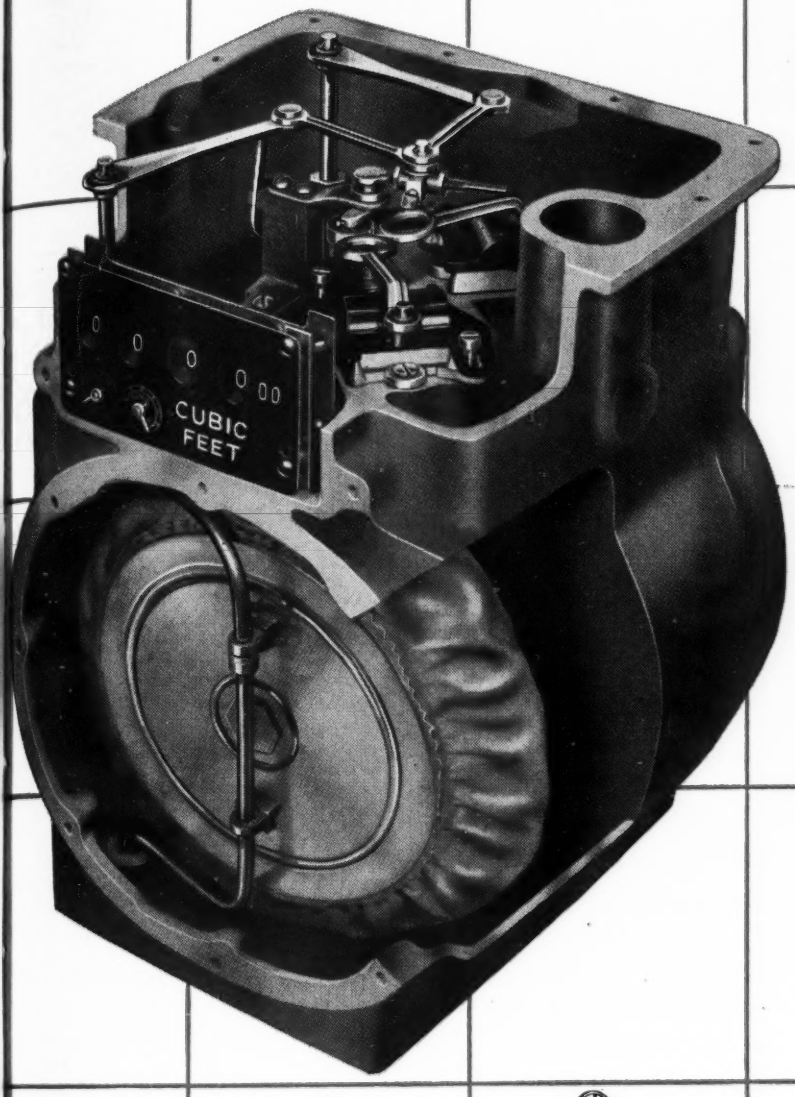
The WEBSTER ENGINEERING COMPANY

TULSA, OKLAHOMA

Division of SURFACE COMBUSTION CORPORATION, Toledo, Ohio

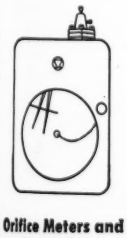
AT LOWEST UNIT COST PER YEAR...



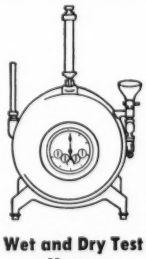


SPECIAL MACHINES AND METHODS

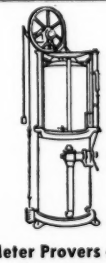
American Meter Company's exclusive Progress-Through machine is one of many American developments designed to combine many separate operations resulting in accuracy in the finished meter unknown before. In this machine, over 100 production tools mill, drill and tap Ironcase meter bodies which are held rigidly in moving fixtures. Accurate positioning of sub-assemblies is assured—each meter body is identically machined relative to precise locating points—each part fits perfectly.



Orifice Meters and Controllers



Wet and Dry Test Meters



Meter Provers and Apparatus

The efficiency and economy of *American* Meters is backed by more than 115 years of experience and by a constant purpose to provide the finest precision instruments known to gas measurement science.

American is and will continue to be the *first name* in metering dependability—always your *first choice* for *"Sustained Accuracy at Lower Cost."*

AMERICAN METER CO. 1836 MEASUREMENT ENGINEERS

AMERICAN METER COMPANY

INCORPORATED (ESTABLISHED 1836)

Brown, denying the willfulness claim, said that his company has no objection to refunding actual overcharges, although it disclaims responsibility for paying treble damages.

Consolidation Sought

Rockland Light & Power Co., Nyack, N. Y. is seeking permission from the FPC to acquire all of the Rockland and Orange county, N. Y. natural gas properties of the Rockland Gas Co. Inc., Spring Valley, N. Y. The purchase would include approximately 259 miles of lines with a maximum daily capacity of 14 MMcf, serving 20 communities in Rockland county.

Behind the desired purchase is the belief that (1) the companies could finance their requirements better on a combined basis; (2) substantial savings would be realized because the companies serve adjacent areas; (3) continuity of service would be assured; (4) gas rate reductions might be possible.

Gas Restriction Eased

The Petroleum Administration for Defense has relaxed its gas service restriction order to permit four New York utilities to take on new space-heating customers.

The four companies and the number of new customers to which they may extend natural gas service are: Niagara-Mohawk Power Corp., Syracuse, 19,000; Central Hudson Gas & Electric Corp., Poughkeepsie, 1150; Rockland Light & Power Co., Nyack, 320; and Rockland Gas Co., Spring Valley, 1000.

Mississippi Would Buy Controlling Interest

Latest move in the Mississippi River Fuel Corp.-vs. Laclede Gas Co. controversy last month found Mississippi River filing a petition with the Missouri Public Service Commission seeking permission to buy a controlling interest in Laclede. The supplier contends that complete control of gas for the St. Louis area by Mississippi River Fuel is in the public interest, charging that the utility failed to cooperate with the pipeline company.

Dismissal was also asked of Laclede's application for an order barring the pipeline from acquiring Laclede stock, its request that Mississippi River Fuel be termed a gas corporation, and that it give up the stock it now holds in Laclede.

Laclede officials replied to the petition to the effect that Mississippi River Fuel does not have the gas to supply St. Louis and is seeking to dominate Laclede in an effort to avoid a contract obligation.

Financial Notes

Authorization was received late in May from the Securities and Exchange Commission for the purchase of Beaumont (Texas) Gas Co. by United Gas Corp. The city of Beaumont had earlier approved the sale. United Gas began service to Beaumont's 2000 customers, mostly industrial and commercial users, early last month.

The United Natural Gas Co., Oil City, Pa., in May purchased the East Brady (Pa.) Fuel Gas Co. distribution plants in East Brady and several smaller communities, including wells, lines, and other production facilities. The Pennsylvania Public Utility Commission issued a certificate of public convenience for the purchase on May 19 and on May 27 UNG began service to its new customers and took over operation of the entire East Brady plant.

A rapid rise in gas prices in the Texas Panhandle field, equalling the total increase which field prices had shown in the preceding eight years, is reported by the Texas Railroad Commission. Prices to producers average 6.3 cents per Mcf of gas delivered at 16.4 lbs pressure, about a 25% increase over 1951 when gas sold for 4.8 cents. Gas delivered at 14.65 lbs pressure now averages 5.6 cents per Mcf, compared to 4.3 cents a year ago.

CHANGING OVER?

..... then consider CARBOSEAL

Trade-Mark

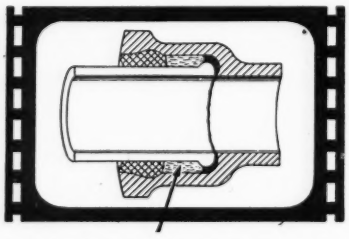
ANTI-LEAK

for dried-out packing.

The jute and hemp packing of bell-and-spigot joints dries out rapidly in dry manufactured or natural gas, propane or butane systems. The result is increased gas leakage, vegetation damage, hazardous conditions, and costly maintenance of dry gas mains. By introducing CARBOSEAL Anti-Leak into your mains, you can save money, reduce dust problems, and get as high as 100% reduction in leakage.

CARBOSEAL Anti-Leak reaches every joint. It swells the jute fibers as much as 44%, and keeps bell-and-spigot joints gas-tight indefinitely. It also wets down rust and dirt in the mains and reduces service calls due to pilot outages.

With CARBOSEAL Anti-Leak, you don't have to uncover every joint or keep adding oil or water vapor to your gas. Where mains are graded, CARBOSEAL Anti-Leak is poured in at high points. As much as 400 feet of level main can be treated through one opening using a hose and nozzle. The average cost to treat one mile of 3-inch equivalent main is less than $100 for the CARBOSEAL Anti-Leak required. Joints treated with CARBOSEAL Anti-Leak 17 years ago are still gas-tight today with no re-treatments necessary. Get the facts by writing for our booklet, F-4506.



You can see exactly how CARBOSEAL Anti-Leak works by writing for our 16 mm. color motion picture which will be loaned to you without charge—Address:

CARBOSEAL ANTI-LEAK

Carbide and Carbon Chemicals Company

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

In Canada: Carbide and Carbon Chemicals, Limited, Toronto

"Carboseal" is a registered trade-mark of Union Carbide and Carbon Corporation.

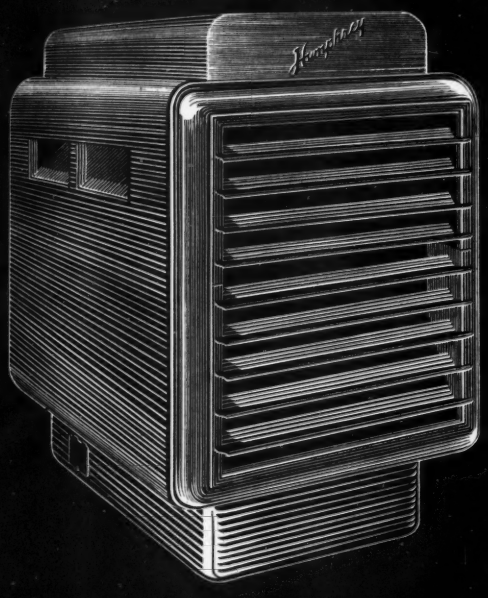
Miscellany

Industry Lowers Number Of Disabling Injuries

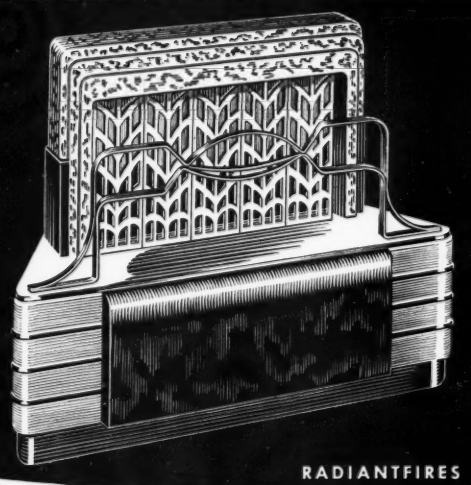
According to AGA reports, the gas industry lowered its number of disabling injuries and the frequency rate of such accidents during 1951. Utilities had 15.72 disabling injuries per million man-hours of exposure in 1951, 1.9% lower than in 1950,

Backed by HALF A CENTURY OF LEADERSHIP . . . IN STYLING . . . ENGINEERING and SALES APPEAL

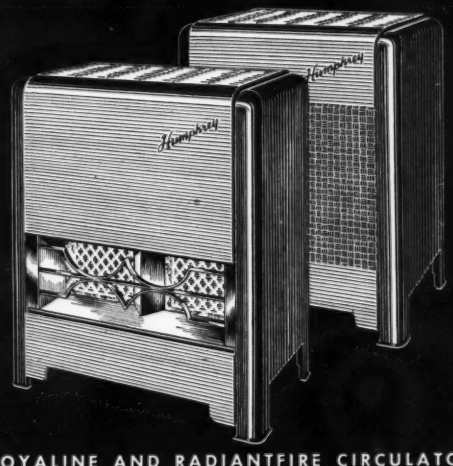
Humphrey gas heating equipment



AUTOMATIC GAS UNIT HEATERS



RADIANTFIRES

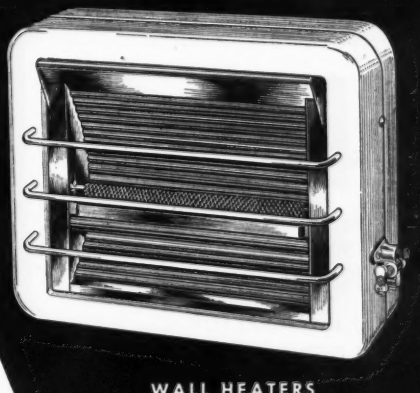


ROYALINE AND RADIANTFIRE CIRCULATORS

There is something about every Humphrey Gas Heater that makes it distinctly different . . . distinctly recognizable as a Humphrey product.

You notice the difference, first, in the handsome styling and rich finish of Humphrey Heaters. You see it, too, in the many exclusive engineering improvements built into the Humphrey. Most of all, you sense Humphrey superiority in the perfection of every construction detail, inside and out.

Because the Humphrey line has been the leader in the gas heating field for more than fifty years, this line is the preferred choice of dealers who handle the most dependable, most saleable products.



WALL HEATERS

HUMPHREY PRODUCTS

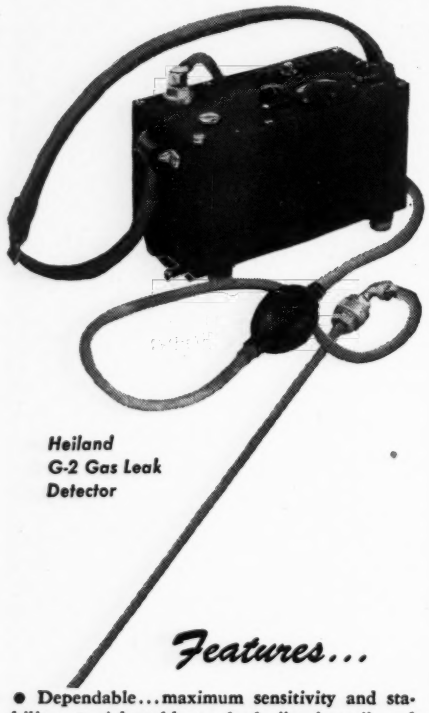
GENERAL GAS LIGHT COMPANY • KALAMAZOO, MICHIGAN

23 WARREN STREET, NEW YORK CITY 2ND UNIT SANTA FE BUILDING, DALLAS 225 ELEVENTH STREET, SAN FRANCISCO

Heiland
DENVER

Economical Efficient

Gas Leak Detection



Heiland
G-2 Gas Leak
Detector

Features...

● Dependable...maximum sensitivity and stability. ● Adaptable to both "aspirator" and "open flow" tests. ● Ruggedly constructed for above average abuse by maintenance crews. ● Lightweight...compact...complete. No separate batteries, meters, gas chambers or dilutors. ● Ability to detect low gas concentrations as well as locating larger leaks. ● Economical operation ...uses only standard flashlight batteries for power source. ● Easy access to all parts of instrument; readily inspected and cleaned. ● Sample may be quickly aspirated through instrument. ● No restrictions in sample path; any rate of aspirator pumping satisfactory. ● Double filters retard the introduction of dirt and dust into gas chamber, greatly prolonging life of filaments. ● Three screens for ample explosion check.

For further details write or wire...

HEILAND RESEARCH CORPORATION
130 East Fifth Ave., Denver 9, Colo.

dependable instruments

Heiland
DENVER

marking the fourth successive yearly decline in the frequency rate.

Accident experience figures, based on a study made by the AGA's bureau of statistics, showed that disabling injuries per 100 employees declined from 3.33 in 1950 to 3.26, a 2.1% decrease. Reports were received from 402 gas utilities and pipelines, representing 90% of the employees in the gas industry.

In the natural gas branch, disabling injuries per million man-hours of work in 1951 were 14.6, 8.4% lower than 1950. In the same period, the manufactured and mixed branch figure was 19.95, corresponding to an increase of 14.9%. The frequency rate for the L.P. gas branch was 9.16 disabling injuries per million man-hours of exposure, about 30% lower than 1950.

The severity rate of accidents during 1951 was 1.04 days charged to disabling injuries for every 1000 hours worked. This was 31.6% higher than in 1950. Natural gas utilities and pipelines had an accident severity rate of 0.99 in 1951, equal to an increase of 26.9% when compared with 1950.

Among 40 industries reporting to the National Safety Council, gas utilities ranked 32nd in the frequency bracket, although showing the above improvement. In the severity rating, the industry was 24th among the 40.

ConEd Instructs Groups On Installing, Servicing

More than 400 employees and principals of appliance dealers, servicing agencies and master plumbers, as well as staff members and inspection personnel of New York City municipal departments and the New York Public Service Commission, have attended a training program on up-to-date installation and servicing techniques set up by the Consolidated Edison Co. of New York. In order to familiarize these groups with the characteristics of both natural and mixed gases, the meetings, with small groups of 10 to 15 in attendance, review practices called for by the city code and the recommendations and standards of the American Gas Assn. and American Standards Assn.

Specially designed laboratory apparatus and standard gas appliances demonstrate flame characteristics, toxicity, and heat content. Principles of appliance and burner construction are shown, proper methods of testing and adjusting operating controls are demonstrated, and special emphasis is placed on venting and draft hoods and the precautions to be observed when installing gas piping.

New York Meter Complaints Bring PSC Order

In June the six utilities serving the New York, Westchester, and Long Island areas were ordered to make monthly reports to the public service commission on consumer complaints and the action taken by the utilities as a result of the 100% increase in complaints on fast gas meters. PSC Chairman Benjamin F. Feinberg reports that complaints received by his office in the first four months of 1952 totaled 1757, compared with 877 in a similar period, prompting the order for reports covering the period from the time of conversion to natural gas to May 31 and for each month thereafter for six months.

Adjustments for fast meters totaling $30,000 have already been made, such adjustments being retroactive to the time of the conversion from manufactured to natural gas. The law allows a 2% variation in rating meters.

Cincinnati Utilities Hit

Approximately 500 gas utility workers in the Cincinnati area joined 6000 strikers early in June. The gasmen were from the gas departments of the Cincinnati Gas & Electric Co. and the Union Light, Heat & Power Co.

While the strike was on, Cincinnati officials stated that servicemen could not be sent to customers' premises and that gas could not be turned on or off, and suggested that plumbers be called for any necessary adjustment of appliances or in case of suspected gas leaks.

According to report, employees of other departments of the companies had newly executed contracts and it was expected that work in all other departments would proceed as usual.

News Notes

On April 1, 1852 in West Chester, Pa. a new plant was to be constructed "of sufficient capacity to generate and purify 50,000 cu ft per day," and the first gas producing plant in that area was under way. The West Chester Gas Co. incorporated on that day; this year, its 100th anniversary is being celebrated by Philadelphia Electric Co., into which it was later merged. Records show that in the early days of the company, the most important stores consumed only 900 cu ft a month, large residences used 400 cu ft. Today, monthly residential use averages 4500 cu ft per home. In those days, however, the selling price of gas was $3.50 per Mcf.

Authority to build new gas distribution lines to Staunton, Litchfield, Hillsboro, Mount Olive, Gillespie, and Carlinville (all in Illinois) has been granted to the Illinois Power Co., Decatur, by the Illinois commerce commission.

The official estimate of the Commerce Dept. and the Bureau of Labor Statistics shows that more money will be spent on construction this year than in any previous year. The prediction: Over 1 million new houses and apartments, including 50,000 public housing dwellings; $32 billion spent for new factories, office buildings, stores, homes, roads, schools, hospitals, and other projects. The record-breaking year of 1951 when $31 billion went into construction will be surpassed by $1 billion.

Because present circumstances do not permit, or require, the issuance of a new tailored regulation for the coke, coal chemicals, and coke oven gas industry, the OPS regulation covering the industry has been extended indefinitely. It was due to expire May 31.

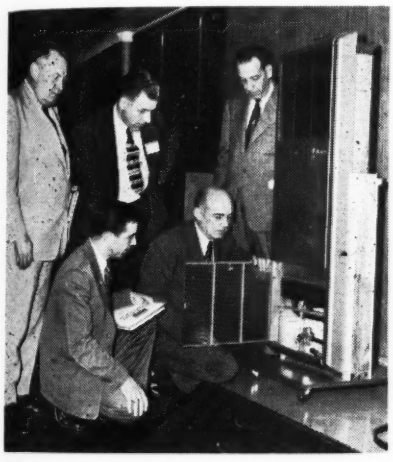
Manufacturers

Utility Representatives Visit Wichita Manufacturer

As a result of the trend to gas heating, there is a need for better training by manufacturers and their wholesale distributors of retail sales personnel, according to utility representatives who met at the Coleman Co., Wichita, Kan., late in May, for a three-day conference with Coleman officials. Adequate training programs, properly presented to the retailer's sales and service personnel, will result in more satisfied customers for the gas utilities.

In answer to the request for more and better training, President Sheldon Coleman outlined to the 18 gas utility and 14 L.P. gas distributor representatives on hand his company's "homecoming" program which brings heating equipment retailers to the Coleman heating institute in Wichita for five-day sales and service clinics. The course, begun last year, has already had more than 1700 attendants. The company expects to bring a total of 7000 key retailers to Wichita.

In turn, President Coleman told the visitors that the efforts to develop new and better gas-heating appliances would be continued. "The industry has made more progress in the design and manufacture of home-heating equipment since the end of World War II than in the preceding 30-year period," he said.



Four of the utility men on hand at Coleman's meeting inspect a new model wall heater. Standing, left to right, are C. B. Ward, Public Service Co. of Colorado; Bernard C. Paul, Ohio Gas Co.; and Don Warner, Gas Service Co. In foreground are Bruce Withers Jr., Waxahachie Gas Co., and V. D. Call, field director of Coleman's utility division.

Among utility representatives attending the conference were: Charles R. Hare, Alabama Gas Corp., Birmingham; Henry D. Hewey, Illinois Power Co., Decatur; Bernard C. Paul, Ohio Gas Co., Bryan; Dan Ewing, Nashville (Tenn.) Gas & Heating Co.; John W. Owens, Central Florida Gas Corp., Winter Haven; Henry W. Rice, New Britain (Conn.) Gas Light Co.

W. M. Sutton, South Atlantic Gas Co., Orlando; C. B. Ward, Public Service Co. of Colorado, Denver; K. D. Rymer, United Fuel Gas Co., Charleston, W. Va.; J. A. Hiller, Portland (Maine) Gas Light Co.; D. W.

ANOTHER HAYS FIRST

STANDARD PACKAGES OF IRON BODY GAS SERVICE STOPS

FEMALE IRON PIPE ENDS

SIZE		¾"	1"	1¼"	1½"	2"
PIECES PER CARTON		25	20	15	10	6
CATALOG NUMBERS / APPROXIMATE GROSS WEIGHTS OF CARTONS	7400	45	55	60	60	55
	7405	45	55	60	60	55
	7420	50	60	65	65	55
	7425	50	60	65	65	55
	7430	50	60	65	65	55
	7435	50	60	65	65	55
	7440	50	60	65	65	60
	7445	50	60	65	65	60
	7482	45	55	60	60	55
	7484	45	55	60	60	55
	7486	50	60	65	65	55
	7488	50	60	65	65	55
	7490	50	60	65	65	55
	7492	50	60	65	65	55

THREADLESS COUPLING ENDS

SIZE	¾"	1"	1¼"	1½"	2"
PIECES	18	12	8	6	4
7500 to 7545	55	55	50	55	55

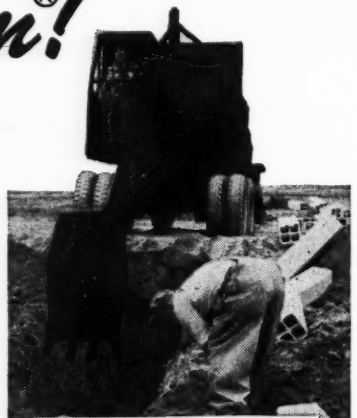
HAYS GAS SERVICE PRODUCTS
HAYS MANUFACTURING CO.
ERIE, PA.

For lower cost trenching

get a Bantam®!

Why fuss around with special "one-purpose" machines, or costly hand crews, when a *low-cost* BANTAM Back Hoe will handle *all types* of trenching jobs at a big saving in time and labor. Truck-mounted BANTAM drives anywhere, on or off highway, at truck speeds . . . maneuvers in close quarters, steep grades and swampy soils, where bigger machines can't go . . . *digs up to 100' of 5' trench per hr.* Send for complete facts today, including details on BANTAM crane adaptor and fast-change backfill blade (extra) for handling *entire* pipe installation with *same* machine.

SB-H-6



Bantam Hoe digs to 14' depth . . . uses 20", 25" or 30" buckets. Easily converted to dragline, clamshell, crane, shovel, etc. Specially engineered for truck mounting.

MAIL COUPON FOR COMPLETE FACTS!

Schield Bantam Co.
268 Park St. Waverly, Iowa

☐ Send details on BANTAM Hoe, including crane adaptor and backfill blade.

Name_____

Position_____

Company_____

Address_____

City_____ State_____

SB-H-6

Cranes • Excavators
Get more jobs done at less cost

CALENDAR

AUGUST

12th Annual Appalachian Gas Measurement Short Course—University of West Virginia, Morgantown, Aug. 25-27.

SEPTEMBER

Pacific Coast Gas Assn. Annual Meeting—Ambassador hotel, Los Angeles, Sept. 3-5.

Wisconsin Utilities Assn. Management Conference—Museum of Science and Industry, Chicago, Sept. 7-9.

ASA Third National Standardization Conference—Museum of Science & Industry, Chicago, Sept. 8-10.

Mid-West Gas Assn. 29th Gas School and Conference—Hotel Sheldon-Munn and Iowa State College, Ames, Iowa, Sept. 11-12.

New Jersey Gas Assn. Annual Meeting—Monmouth hotel, Spring Lake, N. J., Sept. 12.

OCTOBER

Wisconsin Utilities Assn. Technical and Sales Section Convention—Schroeder hotel, Milwaukee, Oct. 1-3.

Independent Natural Gas Assn. of America Annual Meeting — Fontenelle hotel, Omaha, Neb., Oct. 6.

Pacific Coast Regional Restaurant Convention and Exposition—Biltmore hotel, Los Angeles, Oct. 7-9.

California Natural Gasoline Assn. Fall Meeting—Ambassador hotel, Los Angeles, Oct. 10-11.

40th National Safety Congress & Exposition of the National Safety Council—Chicago, Oct. 20-24.

American Gas Assn. Annual Convention—Atlantic City, N. J., Oct. 27-30.

GAMA Exposition—Atlantic City, N. J., Oct. 27-31.

NOVEMBER

American Petroleum Institute Annual Meeting—Chicago, Nov. 10-13.

American Standards Assn.—Waldorf-Astoria, New York City, Nov. 19.

Mid-Southeasten Gas Assn.—The Sir Walter hotel, Raleigh, N. C., Nov. 20-21.

American Society of Mechanical Engineers—Hotel Statler, New York, Nov. 30-Dec. 5.

MARCH 1953

National Association of Corrosion Engineers—Hotel Sherman, Chicago, March 16-20.

New England Gas Assn.—Hotel Statler, Boston, March 26-27.

Mid-West Regional Gas Sales Conference—Edgewater Beach hotel, Chicago, March 27-29.

APRIL

AGA Distribution, Motor Vehicles and Corrosion Conference—Hotel Sherman, Chicago, April 12-16.

National Conference of Electric & Gas Utility Accountants—Hotel Sherman, Chicago, April 20-22.

Southwestern Gas Measurement Short Course—University of Oklahoma, Norman, April 21-23.

Indiana Gas Assn. Annual Convention—French Lick Springs Hotel, French Lick, Ind. (Tentative) April 23-24.

MAY

34th Annual National Restaurant Convention & Exposition — Navy Pier, Chicago, week of May 10.

Southern Gas Assn.—Jung Hotel, New Orleans, May 11-13.

GAMA Annual Meeting—The Greenbrier Hotel, White Sulphur Springs, W. Va., May 20-22.

AGA Production and Chemical Conference—Hotel New Yorker, New York City, May 24-27.

Hamilton, Citizens Utilities Co., La Junta, Colo.; William D. McCormick, Hartford (Conn.) Gas Co.; A. H. Pfaff, Council Bluffs (Iowa) Gas Co.; I. E. Rowe, United Gas Corp., Jackson, Miss.; James M. Hinds, Fall River (Mass.) Gas Works; Bruce Withers Jr., Waxahachie (Texas) Gas Co.

Ivan J. Zancker, Southern Union Gas Co., Clovis, N.M.; C. L. Byers, Southern Union Gas Co., Galveston; H. G. Peterson, North Penn Gas Co., Port Allegany, Pa.; Howard B. Yost, Hope Natural Gas Co., Clarksburg, W. Va.; Ralph E. Fuller, Buzzards Bay Gas Co., Hyannis, Mass.; Carl J. Olson, Central Gas & Electric Co., Lincoln, Neb.; John R. Scheel, Central Indiana Gas Co., Muncie; and Don Warner, Gas Service Co., Wichita.

3rd Quarter Allotments Up

Higher allotments of controlled materials to manufacturers for the third quarter of 1952, according to NPA, will be attributed to the government's material control measures and cooperation on the part of industry in the conservation of scarce materials. Administrator Henry H. Fowler pointed out that although some subsidiary metals may be decontrolled as their supply improves, many materials will continue in tight supply.

Third quarter allotments for all household durable goods, including domestic ranges, will be above current levels. Aluminum allotments will increase from 30% to 45% of base in the second quarter, 45% in the third, and the general level of copper allotments will be 15% higher than given for the current quarter. The minimum level for brass mill and copper foundry products has been increased from 10% to 20% of base period consumption.

Manufacturers Notes

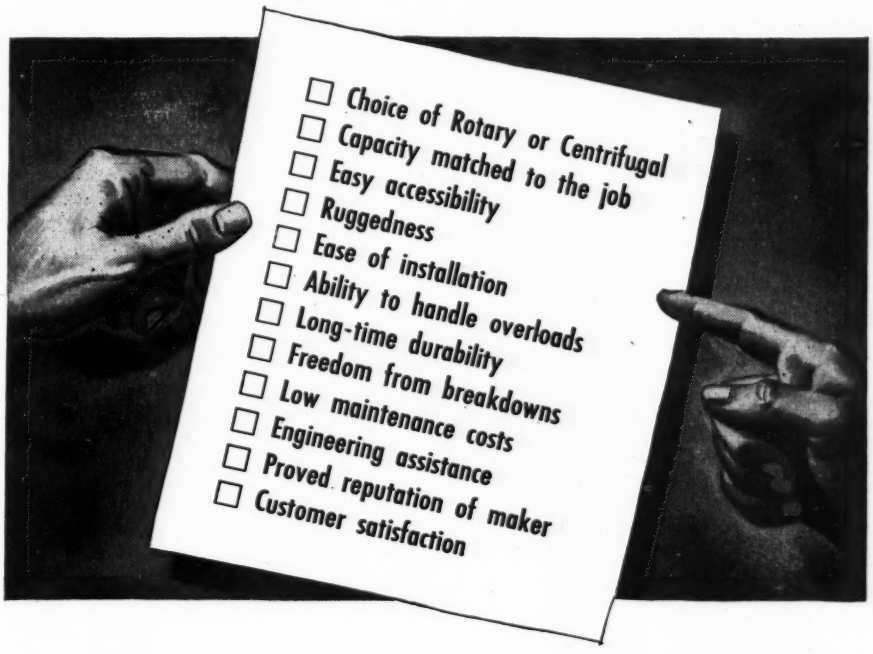
Townley Metal & Hardware Co. has been appointed distributor for Servel refrigerators and water heaters in the Kansas City area. The firm, headed by Webster W. Townley, has been in business in Kansas City for 68 years.

To increase the effectiveness of both national and local ads by intensifying identification of national copy, Caloric Stove Corp., Topton, Pa., has inaugurated a dealer mat service which will make available to each dealer a tie-in mat for every Caloric national ad. The two- and three-column tie-in mats will be reproductions of national ads and will carry a streamer saying that the ads were reprinted from leading national magazines.

His 25th year of association with the Selas Corp. of America was celebrated recently by President Frederic O. Hess when he was guest of honor at a dinner party attended by approximately 300 employees and friends. During the affair at the Warwick hotel in Philadelphia, Mr. Hess was presented with a silver coffee service and a matched set of aluminum luggage in recognition of the event.

White-Rodgers Electric Co., St. Louis, has opened a new branch in Detroit, where a complete supply of controls will be warehoused for servicing Detroit and surrounding area. The branch will also operate as

BEFORE BUYING *any* BLOWER COMPARE THESE ESSENTIALS



When production depends so vitally on adequate handling of gas or air, you can't afford to take chances on the performance of your blowers or exhausters. It's better to be safe than sorry.

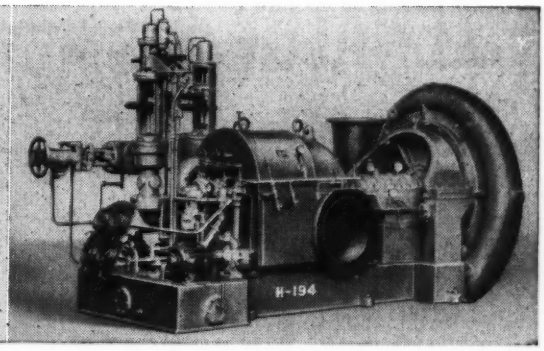
So, for new installations or replacements, we suggest that you evaluate the equipment by the above standards of comparison. This will help determine the unit that will be most effective, economical and reliable for your specific applications.

Be sure to include the R-C *dual-ability* line of both Centrifugal and Rotary Positive types. Remember, that only we offer you this *dual choice* —with unbiased recommendations from almost a century of experience. With capacities from 10 cfm to 100,000 cfm or higher at moderate pressures, R-C equipment has a long record of outstanding performance in industrial applications.

We'll gladly send detailed information for comparison—or supply engineering help if we can be of service.

ROOTS-CONNERSVILLE BLOWER DIVISION
521 Oregon Avenue, Connersville, Indiana

CENTRIFUGAL



Type OIB Gas Exhauster. Capacity 19,000 cfm, driven by 332-hp steam turbine.

ROOTS-CONNERSVILLE BLOWER
REG. U. S. PAT. OFF.
BLOWER BUILDERS SINCE 1854
A DIVISION OF DRESSER INDUSTRIES, INC.

an exchange agency with replacement facilities. Future plans call for a laboratory for testing controls.

Ross Roy Inc., Detroit, has been appointed as the new advertising agency for Servel Inc.'s air conditioning division, according to Robert M. Stevens, company advertising manager. Also recently announced was the appointment of Hicks & Greist Inc., New York, as advertising agency for the Evansville, Ind., firm's appliance line, including household refrigerators, water heaters, and room air conditioners.

An agreement has been entered into between the Wulff Processing Co., the Lummus Co. (New York), The Fluor Corp. Ltd. (Los Angeles), and the Girdler Corp. (Louisville) under which the latter three companies are authorized to design and construct plants for applications of the Wulff process for making acetylene and ethylene. The Wulff organization has been operating a pilot plant in Maywood, Calif. for the past 18 months.

Regulation

Commissioner Testifies In Texas Tax Case

Continuing debates on the value of state regulation to the natural gas industry marked the June hearings on the gathering tax case in Austin, Texas when Attorney General Price Daniel cited the views of William J. Murray Jr., member of the Texas Railroad Commission. Commissioner Murray testified that the state would benefit if it could prohibit gas exports entirely and make industries move to Texas to use it.

He added, however, that he favors letting the interstate pipelines buy the gas, if they will pay more than Texas consumers, since that is the way the nation's economic system works. Tying up the gas reserves in long-range contracts for delivery to distant points is opposed by Mr. Murray. He also believes that Texas is making it profitable for the pipelines to operate.

Three cases filed by gas companies are awaiting decision; more than 50 were filed by gas companies seeking a refund of taxes paid since last September. The cases were to be argued June 30. The plaintiffs argue that state conservation laws have nothing to do with taxes and that the state is trying to tax interstate commerce, and that it cannot do so.

Uniform Gas Prices Sought by Louisiana House

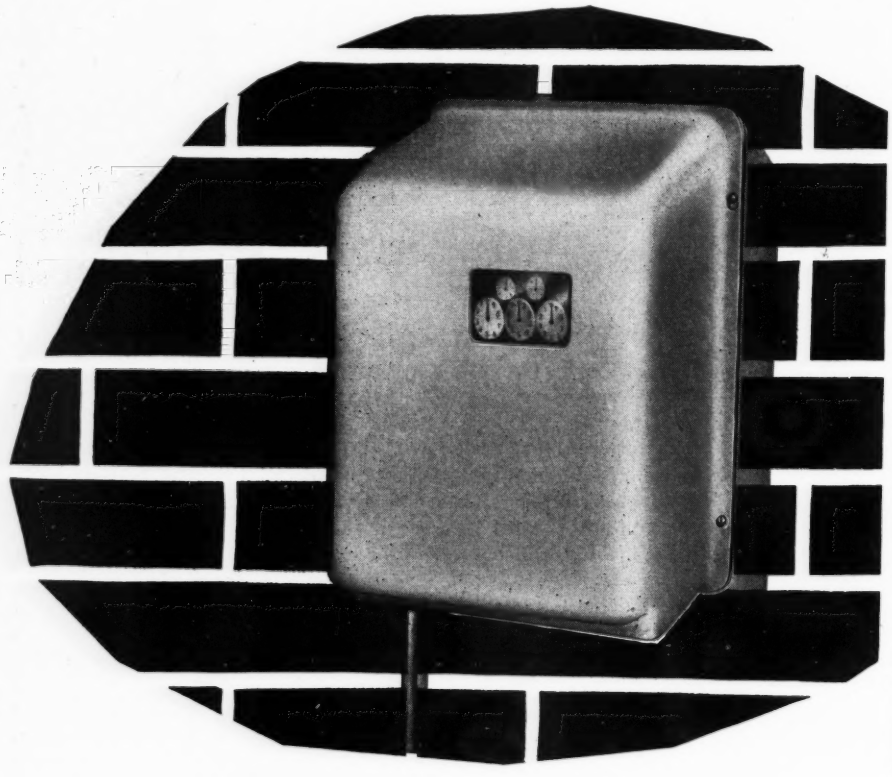
Uniformity in prices for natural gas of like grades for pressure produced from a common source has been asked in five bills introduced by Representative J. Marshall Brown in the Louisiana House of Representatives in May.

House Bill 470 (applying to all pur-

"Bake-Off" Held

An elimination contest, with eight near-champion cake-makers brought together from branch office areas, had to be held recently by Brooklyn Union Gas Co. to determine the real champion. Mrs. Elsa Kathmeyer, Brooklyn, proved to be the best at the giant "Bake-Off" with her "Black Beauty" cake and walked off with the Roper range she is shown standing beside.

More than 500 onlookers watched as Judges Josephine McCarthy, cooking expert; Elsa Steinberger, Brooklyn Daily Eagle, Janet Shushky, home-ec professor, and Marjorie Wardman, Long Island Lighting Co., judged Mrs. Kathmeyer the best. Runner-up Mrs. George Gilliland, shown with Roper representative Charles Richardson and Mrs. Kathmeyer, won a Whirlpool gas clothes dryer. Third place winner, Mrs. B. Braunstein, received a set of aluminum ware.



. . . now—the "side wall" ZENALOY gas meter cover

A new meter cover to attach to the side walls of residences or other buildings, for localities where climatic conditions make it inadvisable to install gas meters and regulators directly on the ground. Made of a new material, Zenaloy,* these meter covers combine appearance with strength and lightness, protect the regulator from vent freeze-ups and deterioration caused by the elements; make painting unnecessary; and nest for easier shipment and storage. Clear plastic window of hard vinyl won't discolor and protects dials. Address inquiries for prices, delivery and other data to

*ZENALOY is the trade name for the Reinforced Plastic Products manufactured by ZENITH PLASTICS CO., Gardena, Calif.

GORDON Z. GREENE CO.
Manufacturers of Oil and Gas Specialties
2335 E. Eighth St., Los Angeles 21, Calif. • TUcker 1279

chasers of gas) declares: "It shall be unlawful for a person purchasing natural gas from a common source of supply to pay a different price to different producers of like grades and pressures of natural gas or to discriminate between said producers in any other way."

Bill 471, providing that it shall be unlawful for any purchaser of natural gas to measure such gas on a pressure base in excess of 15.025 psia, is designed to prevent pipeline companies from purchasing at a high pressure, but on the basis of thousands of cubic feet, and selling at a lower pressure. The drop in pressure results in a larger volume of gas, measured on the cubic foot basis.

It shall be unlawful, according to Bill 475, for a purchaser of natural gas from a common source of supply to refuse to purchase gas ratably from each producer from the common source.

For violation, a penalty has been prescribed in each measure for a fine of from $50 to $500, or imprisonment up to 30 days, or both, for each offense. House bill 474 amends the common purchaser section of the revised statutes to the extent of applying the same penalty for a violation.

House bill 472 amends two provisions of the common purchaser section of the code. At present Section 42 provides that a common purchaser shall purchase all of the gas offered for sale or, if unable to purchase it all, shall buy ratably from the producers in the common source of supply. This provision is changed to read "which may reasonably be reached by its (the common purchaser's) trunk lines or gathering lines." The present discretion of the commissioner of conservation to suspend the requirement for ratable purchase of gas is eliminated in the bill. Also eliminated is the provision that in the event the owner of a well in a common source of supply refuses to sell gas to the pipeline "the common purchaser shall have the same rights of action against the owner as the seller has against the common purchaser who refuses to buy . . ."

In Section 43 a provision is made that "it shall be unlawful for . . . a common purchaser to discriminate in price or in any other way between like grades and pressures of natural gas." It also provides that "a common purchaser, in lieu of paying identical prices to different producers for like grades and pressures of natural gas, may permit the use of his pipelines, particularly gathering lines, to any producer of natural gas for reasonable cost."

Ohio Commission Acts On Space Heating Freeze

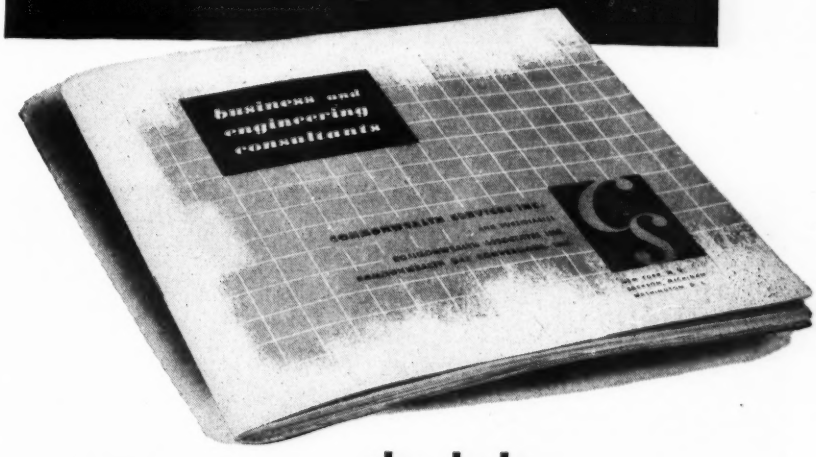
While the Cincinnati (Ohio) Gas & Electric Co. was authorized in May by the public utilities commission to take on 8400 additional space-heating customers, the Ohio Supreme Court later ruled against CG&E and the city of Cincinnati in affirming the PUC's order which denied the utility's request for an additional 2167 customers.

Of the 8400 installations granted, half are to be made in new buildings, with the other half going into conversions. Not more than 5% of each half is to be installed in commercial buildings.

The commission's relief announcement

More and more Utilities and Industries find the need for

Consulting Services



the help you want, when you need it or before

INVESTIGATIONS
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We invite your inquiry.
Write for our booklet describing in detail the many services available to you.
Address: Department B
20 Pine Street, New York 5, N. Y.

Commonwealth Services Inc.

and subsidiaries
COMMONWEALTH ASSOCIATES INC.
COMMONWEALTH GAS CONVERSIONS INC.
20 Pine Street, New York 5, N.Y.
Jackson, Michigan Washington, D.C.

also authorized the Dayton Power & Light Co. to take on 4900 new customers; Ohio Fuel Gas Co., Columbus, 15,260; Portsmouth Gas Co., 500; United Fuel Gas Co., Charleston, W. Va., 118; and Manufacturers Light & Heat Co., Pittsburgh, 898.

Regulatory Newsnotes

Appointment of James A. Colvin of Minneapolis as director of the Engine and Turbine Division was announced May 5 by the National Production Authority, Department of Commerce. Mr. Colvin is on leave from his post as manager of power production and system operation for Northern States Power Co., Minneapolis. He succeeds Otis Howard of Oklahoma City, who is returning to his post as manager of operations for Oklahoma Gas & Electric Co.

Sales and Promotion

Anniversary Celebrated By Incentive Prize Firm

Cappel, MacDonald & Co., Dayton, Ohio, is celebrating its 30th birthday in the prize incentive field with its anniversary incentive merchandise catalog. In the 30-year period, $80 billion worth of goods and services have been sold with the help of the merchandise prize catalogs published by the firm, originators of the program.

Cappel, MacDonald, directing prize campaigns to spur sales, increase safety, etc., issues a sample catalog with examples of the many ways industry leaders now use incentive programs to reach profitable objectives. The 1952, 56-page catalog features prizes ranging from a 65-cent tie rack to a $670.50 piano. More than 350 different sources of supply are represented.

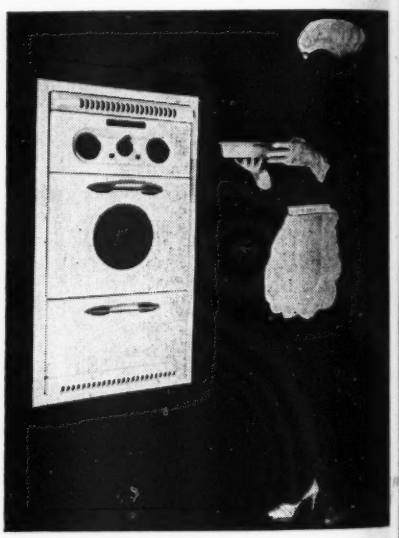
4th Round Up Planned

National advertising, paving the way for local follow-ups and follow-throughs with local newspaper advertising mats and point-of-purchase display kits, will spearhead the fourth annual Old Stove Round Up scheduled for Sept. 7-Nov. 30.

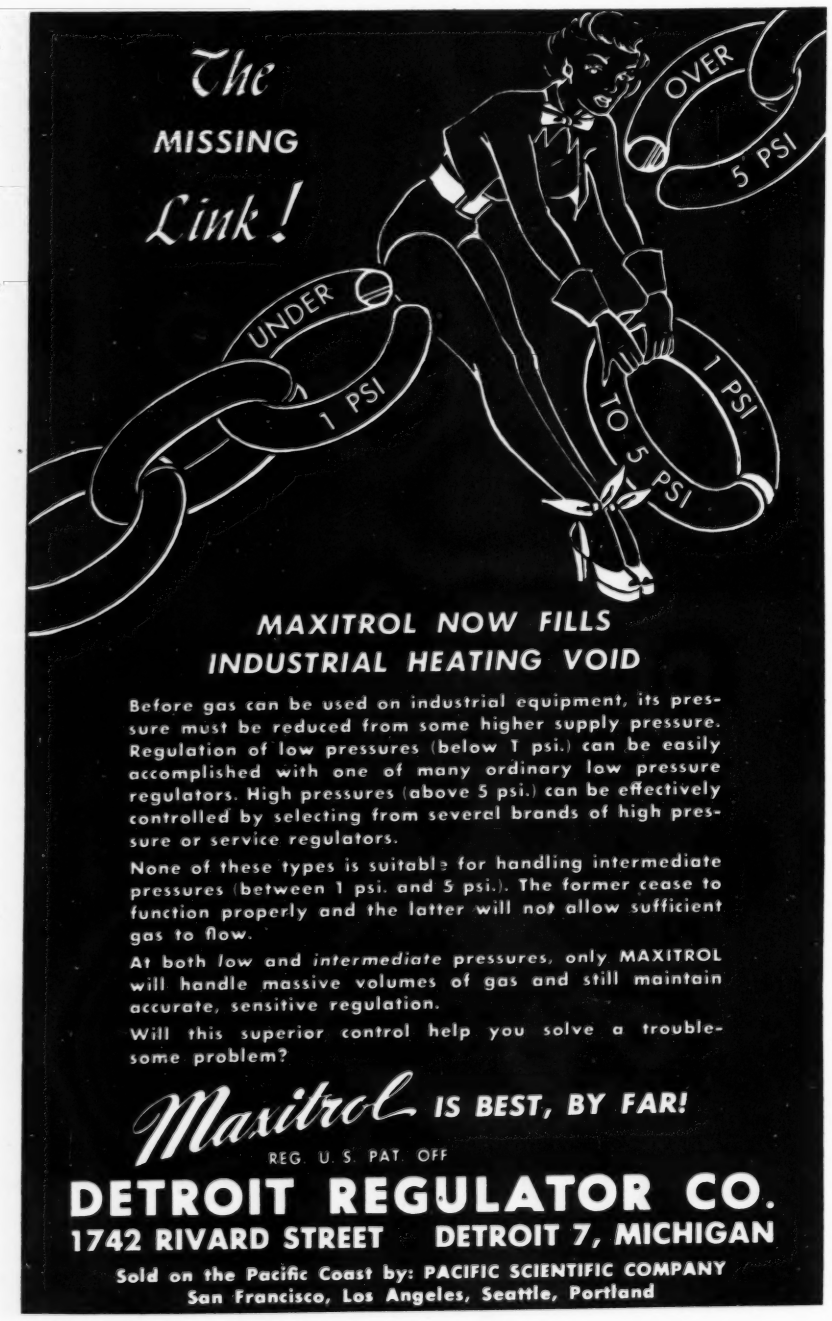
Ten double-spread and single-page ads will be seen by 321,864,000 readers in such publications as *Woman's Day, Good Housekeeping, Woman's Home Companion, American Home, Today's Woman,* and *Family Circle.* The final national ads will appear in *Life, Ladies' Home Journal, Better Homes and Gardens,* and *Parents Magazine.* A series of three local advertising mats can be utilized by utilities as center pieces for a page, or doublespreads of dealer ads. Point-of-purchase kits will include display pieces, counter cards, jumbo price tags, banners and pennants.

Contest Winner Named

As a part of its program to push the sale of gas-fired incinerators, the Rocky Mountain Gas Assn. awarded a Denver member, Mrs. Mildred A. Waddell, Independent Gas Service Inc., an incinerator for her essay on "The Use of a Gas-Fired Incinerator Benefits the Householder, His Family, His Neighborhood, and His City in the Following Ways." She told her story in 100 words or less as one of the many entrants in the sales contest.



This "invisible cook" is actually Home Economist Maxine Howe, instructor at a cooking school held in Pasadena, Calif. attended by 9000 women. The disembodied effect was achieved through the use of luminous paint and a "black light" spot, calling dramatic attention to the appliances used and every move made by Miss Howe. Southern California Gas Co., GAMA, and local newspapers sponsored the school.



MAXITROL NOW FILLS INDUSTRIAL HEATING VOID

Before gas can be used on industrial equipment, its pressure must be reduced from some higher supply pressure. Regulation of low pressures (below 1 psi.) can be easily accomplished with one of many ordinary low pressure regulators. High pressures (above 5 psi.) can be effectively controlled by selecting from several brands of high pressure or service regulators.

None of these types is suitable for handling intermediate pressures (between 1 psi. and 5 psi.). The former cease to function properly and the latter will not allow sufficient gas to flow.

At both *low* and *intermediate* pressures, only MAXITROL will handle massive volumes of gas and still maintain accurate, sensitive regulation.

Will this superior control help you solve a troublesome problem?

Maxitrol IS BEST, BY FAR!

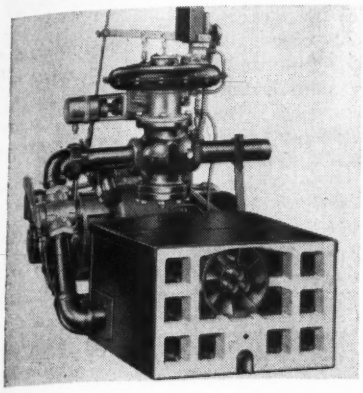
REG. U. S. PAT. OFF

DETROIT REGULATOR CO.

1742 RIVARD STREET DETROIT 7, MICHIGAN

Sold on the Pacific Coast by: PACIFIC SCIENTIFIC COMPANY
San Francisco, Los Angeles, Seattle, Portland

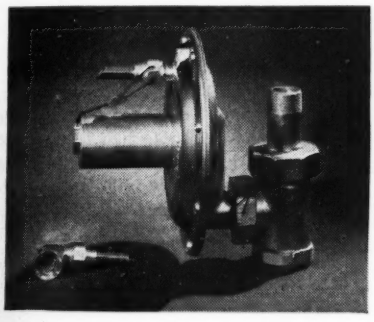
NEW PRODUCTS



Gas-Oil Burner

This new Mettler combination burner is a completely packaged unit embodying electric spark ignition of either gas or oil. Included is the Mettler rectifier pilot with flame failure protection and automatic fuel control. Manually, just a flip of the switch is necessary to transfer from gas to oil or oil to gas. The transfer can also be made automatically by remote controls. Capacity: 50 hp on gas or oil. According to the manufacturer, the burner's best application is in difficult jobs requiring dual fuels at commercial and industrial capacities.

Model: Fan-Air MGO-3.
The Mettler Co. Inc., 4366 Worth St., Los Angeles 63.



Service Regulator

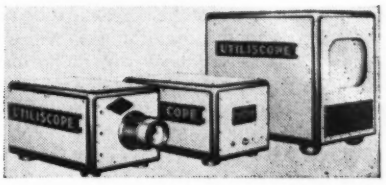
Designed for installation indoors, Universal Controls' new regulator is especially suitable for cold, northern areas. Piping or tubing connects to the casing of the regulator for venting diaphragm breathing and for possible relief valve discharge safely outside the building. Separate vents for relief and breathing out of doors assure protection against ice and insects. An outside weather- and bug-proof breather vent has been developed for use with Type 51-R.

An auxiliary passageway with a cross sectional area approximately 15 times that of a pilot tube has been incorporated in the stem guide piece carrying the pilot tube. The passageway is closed in normal operation but opens instantly under emergency relief valve discharge conditions. Choking in the vent connections is prevented through the check valve action. Should the outlet or normal low pressure of a regulator build up above a predetermined set point, an internal-type relief valve is opened, eliminating danger of high pressures passing through to appliance outlets.

Model: Universal's Series 51-R.
Universal Controls Corp., Dallas.

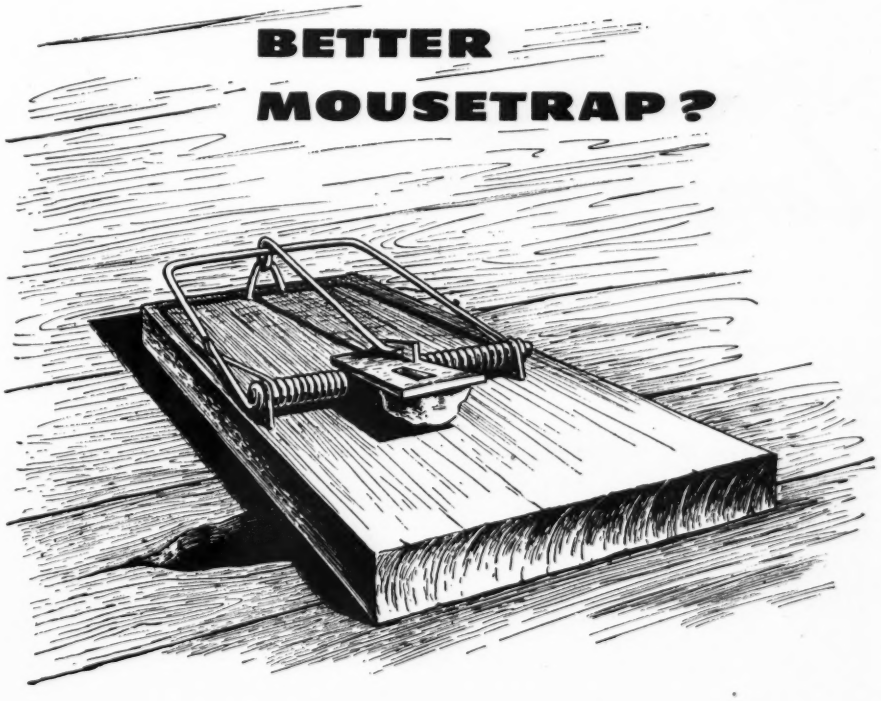
Wired Television

The "Utiliscope," completely installed, consists of a camera, a small power unit, and the monitor or viewing unit. Its uses include centralized control of operations involving widely stationed personnel, remote control of dangerous operations with safety



for personnel who still see the process at close range although behind barriers or at a greatly removed distance, and quality control of processes that cannot be viewed directly. Applications include observing conditions inside furnaces, coordinating materials flow on conveyors, etc.

The image dissector, a cold cathode camera tube, permits a simplified circuit. The



The story of the reward for a better mousetrap is proverbial. But the fact remains that most mice are still caught by this simple, economical and effective contraption.

Gas purification is a parallel case.

Iron Sponge, preferred for the removal of H_2S seventy-five years ago, is still preferred today. And for these same reasons . . . simplicity, economy and effectiveness.

Iron Sponge operates with high efficiency at high or low pressures, has excellent capacity and activity, gives long service between foulings and is simply and quickly regenerated.

CONNELLY, Inc.

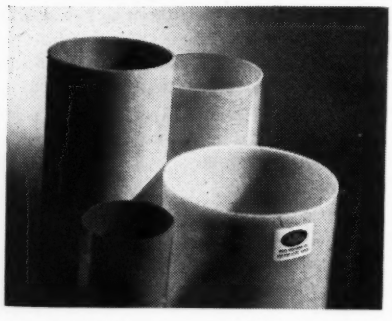
3154 S. California Ave., Chicago 8, Ill.
Elizabeth, N. J. • Los Angeles, Calif.

power which operates the dissector tube and sends signals to the monitor over a 3-lead co-axial cable is supplied from 8 ordinary vacuum tubes. The power unit has a 250-watt capacity.

Model: 300-B Diamond Utiliscope.
Diamond Power Specialty Corp., Lancaster, Ohio.

Plastic Tubing

A recently developed tubing of thermo-setting plastic, Fiberglas-reinforced, is now on the market. With standard fittings it is suitable for piping installations. It is available in standard sizes from 4- to 10-in. OD



with wall thicknesses ranging from .030 in., but it is not manufactured in sizes smaller than 4-in. Sizes up to 36-in. OD are available to order.

The tubing has a tensile strength up to 35,000 psi and a flexural strength up to 65,000 psi. Varying with diameter and reinforcement, burst pressures range to 3000 psi. Straight sections of 20 ft in length are coupled by cemented sleeves.

The pipe is corrosion-resistant to weather, soil, liquids, and gases. It is non-porous with perfect uniformity throughout, the manufacturer states. Temperature stability assures continuous operation between temperatures ranging from minus 60° F to 230° F.

Model: Reflin plastic tubing.
Reflin Co., Dept. B-11, 5825 Higuera, Culver City, Calif.

Want longer wear? Switch to Lancaster Metal Rim Diaphragms —it's the short cut to more years of service. Thousands of records show 10 . . . 15 . . . 20 and more years of continuous use in the meter.

Want greater accuracy? Lancaster Metal Rim Diaphragms are designed and quality built to assure sustained accuracy in gas measurement year after year. Send for a sample today and see for yourself.

METER PARTS CO.

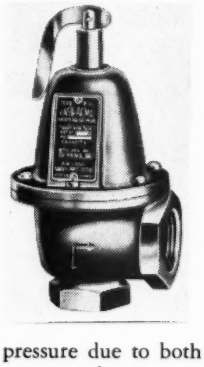
Domestic Range

One of two new 40-in. Universal models introduced by Cribben & Sexton at the June Furniture Mart, the Whitehall (pictured) has simmer-save burners with a solid oven door, a divided cooking top, 17-in. oven, and 17-in. in-a-drawer broiler, and sells in the less-than-$200 price range.

Its companion, the Shelburne, has clic-set burners, glass oven door, and an oven light, with the same range top, oven, and broiler specifications as the Whitehall. Both have mechanical timers, back rail lights, one-piece tops, plate-sized burner bowls, and two storage drawers.

Model: Whitehall.
Cribben & Sexton Co., 700 N. Sacramento Blvd., Chicago.

Safety Relief Valve

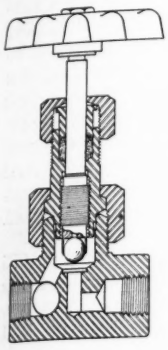


A new safety relief valve has been developed for use on hot water space heating boilers, tanks, and heaters. It is available in pressure settings from 30 to 125 lb, with corresponding Btu ratings at various pressure settings. The new valve has sufficient capacity to relieve pressure due to both thermal expansion of water, and steam caused by failure of the firing device to shut off. It is an all-bronze valve, incorporating an exceptionally high

lift design, stainless steel spring, and silicone seat disc.

Model: Type F-51.
A. W. Cash Valve Manufacturing Corp., Wabash & Morgan, Decatur 60, Ill.

Ball Valve



Recommended for working pressures up to 3000 psi, this new Foxboro ¼-in. ball valve is particularly useful on meter manifolds, gauge lines, seal chambers, bleed-off connections, sampling connections, and lubricator shutoffs in gas, liquid, and steam service. Tight, positive shutoff is provided by the stainless steel ball which closes into a machined, conical seat. The ball is free-rolling; every closing brings a new surface into contact with the valve seat.

Stainless steel is also used in the long-stroke stem and packing gland. The packing is preformed, graphited asbestos with a plastic binder. It is replaceable without shutting off the line pressure or interrupting the process. Straight-through and angle types are available with two or four connections.

Foxboro Co., Foxboro, Mass.

ABSTRACTS

COMPARATIVE STUDY OF VARIOUS METHODS OF COOKING—AGA Laboratories Research Report No. 1182. Part II, Heat Application in Gas Oven Cookery.

Experimental work conducted at the laboratories has yielded data which indicate that conventional type gas range ovens are capable of supplying the correct quantities and proportions of radiant and convected heat needed for usual baking and roasting operations. The food being cooked determines the quantity or proportion of radiant heat absorbed as well as the total rate of heat absorption for the oven temperature provided.

A method has been developed for analyzing heat distribution and types of heat transfer in an oven by the use of instrumented copper discs. This method is described and demonstrated with typical data for the benefit of those concerned with the details of appliance design. These data indicate, for example, that the maximum theoretical span of oven temperatures which may be employed for layer cake baking by altering the heat receiving characteristics of the cake is between 333° and 450° F.

In view of findings to date, it is planned that further research effort will be directed toward an investigation of the effect of variations in oven design features and load on temperature conditions and heat balance in the oven.

Material presented has been obtained from PAR Plan Research Project DGR-11-C, "Comparative Study of Various Methods

THE NORMAC
BELL JOINT CLAMP

A SIMPLE SOLUTION for one of the GAS INDUSTRY'S *most trying problems*

Solves Your Joint Repair Problems • Quick • Easy • Permanent

Installed in small pavement openings. Available in all standard sizes from 3" to 12". A simple set of tools cleans the joint, installs the clamp . . . often in only a quarter of an hour. SAVES TIME. SAVES MONEY and the repair is permanent. Designed for all conditions particularly where pavement repair costs are prohibitive. Such small opening repairs are scarcely noticeable when pavement is replaced.

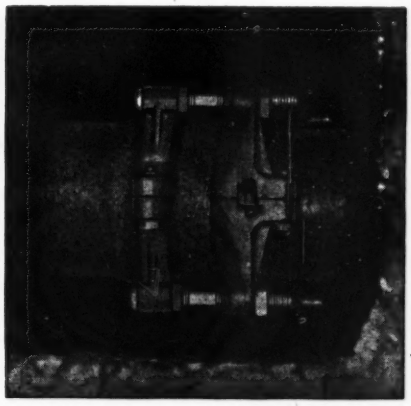
Normac Clamps can be installed in large as well as small openings.

Norton-McMurray hold definite leadership in the development of methods for installation and rehabilitation work through small openings. We welcome the opportunity to help solve a problem you may have—tell us about it.

Write for our catalog describing our complete line of

COUPLINGS . . . FITTINGS . . . SERVICE TEES and ELLS . . . SLEEVES . . . COMPRESSION-END COCKS . . . METER BARS and BRASS FITTINGS for copper pipe.

6 inch Normac Clamp being lowered into hole for installation



6 inch Normac Clamp in service after installation

NORTON-McMURRAY MFG. CO.
122 SOUTH MICHIGAN AVENUE • CHICAGO 3, ILLINOIS
Method and product covered by U.S. Patents, Nos. 2,163,261 and 2,178,286.

of Cooking." Price: $1.

PERFORMANCE OF A WARM-AIR RADIAL-FEEDER PERIMETER-LOOP SYSTEM IN A RESIDENCE—Prepared by M. E. Childs, R. W. Roose, and S. Konzo, of the University of Illinois, and reprinted from *Heating, Piping & Air Conditioning*.

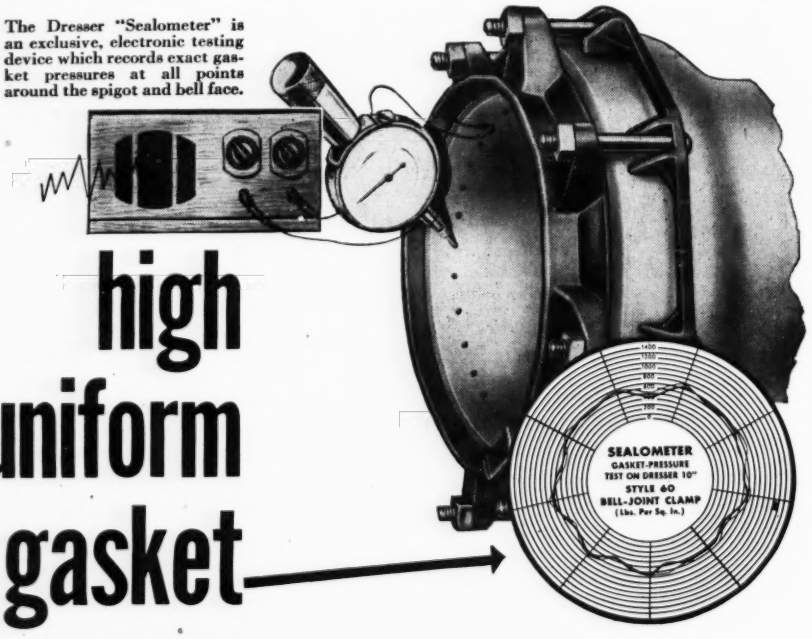
Performance data are given for a radial-feeder perimeter-loop heating system installed in Warm-Air Heating Research Residence No. 3 at the University of Illinois. This residence was a low-cost basementless house with a concrete slab floor laid on the ground.

The radial-feeder perimeter system consisted of an 8-in. diameter warm-air duct embedded in the concrete slab in the form of a single loop around the periphery of the floor, and of a series of 8-in. diameter radial-feeder ducts connecting the perimeter duct with a subfloor plenum below the furnace.

Four arrangements of feeder ducts were studied, including two arrangements with three feeders each, a four-feeder arrangement, and a five-feeder arrangement. Best results were obtained with the arrangements in which feeder ducts were extended into the corners of the residence.

The system gave excellent results; room-air temperature differentials were small, cold areas on the floor surfaces were practically eliminated, and no difficulty was experienced in the thermostatic control of room-air temperature during periods of rapidly changing weather conditions.

The Dresser "Sealometer" is an exclusive, electronic testing device which records exact gasket pressures at all points around the spigot and bell face.



high uniform gasket pressure

SCIENTIFICALLY PROVED, THE DRESSER STYLE 60 BELL-JOINT CLAMP ASSURES PERFECT SEALING

• In a bell-joint clamp, the *minimum* gasket pressure must always exceed the *maximum* line pressure in order to prevent leakage. Thus, the greater the ratio of gasket pressure to working pressure, the higher is the factor of safety of the joint.

The Dresser Style 60 Bell-Joint Clamp, because it is scientifically designed and tested to provide *uniformly high* gasket pressures, assures a wide margin of safety—a more perfect seal every time. Because it has "essential adjustability" and a close fit (even on off-size pipe), there are no weak points through which gasket pressures may be lost.

Check your stock of Style 60's today. Sizes 3″ thru 60″.

Fix it once . . .
Fix it for good!

DRESSER BELL-JOINT CLAMPS

Dresser Manufacturing Division, 59 Fisher Ave., Bradford, Pa. (One of the Dresser Industries) • In Texas: 1121 Rothwell St., Houston • In Canada: 629 Adelaide St., W., Toronto, Ont. • Sales Offices: New York, Philadelphia, Chicago, Houston, San Francisco.

FIRE POLISHING OF GLASSWARE — Designated Information Letter No. 47, it has been issued by the AGA industrial processing committee (E.V.K. Schutt, chairman) and prepared by Robert C. LeMay, chairman of the glass and ceramics processing subcommittee.

Properly applied and controlled gas burners can successfully replace other methods of removing dangerous cutting edges and unsightly mold or grinding marks on glassware and, at the same time, seal incipient cracks and increase surface luster. This information letter explores present practices and methods and discusses the four basic requirements for the application of gas-burning equipment. A number of typical installations are described which will serve to illustrate the many opportunities for additional gas load in glass fire polishing field.

GAS-FIRED GALVANIZING FURNACES —Information Letter No. 46, issued by the 1952 metals committee of the AGA and prepared by Allen M. Thurston for the 1951 committee.

The process of galvanizing is as varied as there are products requiring this particular treatment and the equipment to do the work varies from plant to plant. The purpose of this letter is to set forth some fundamentals which must be adhered to for satisfactory processing. The range of gas equipment and its application to galvanizing processes is broad enough to meet any situation that may be encountered by the industrial gas engineer.

Galvanized products vary greatly in volume versus surface area, in kind of metal being galvanized, in size and in weight, necessitating continuous pots or jobbing pots. Hence, any and all figures supplied may not apply to some special process such as continuous sheet galvanizing.

EXPERIENCE WITH CORROSION IN GIRBOTOL PLANTS—By H. M. Wilten, prepared for the API's division of refining. In the Girbotol process, monoethanolamine is used as an absorbent. From the corrosion point of view, amines behave similarly to ammonia. Thus, the principal material of construction is mild steel. However, an excessive rate of corrosion may be encountered in places where velocity of gases or liquids is high. This is due to the erosive action of sludge iron sulfide.

Hydrogen attack has been encountered. Coolers and exchangers present no particular trouble except for stripper reboilers. Steel tubes give about two years' service. Tubes of 18-8 molybdenum-type material failed prematurely. The 12- to 14%-chromium tubes appear to be satisfactory. Clad shell of the same material will be tried in the future. Centrifugal-type pumps made of cast iron have been found serviceable in these units.

CORRECTION

In the May issue of GAS, p. 67, a news story appeared covering the affiliation of the Natural Gas Odorizing Co. Inc. with the American Research & Development Corp., Boston. In the headline, it was stated that Natural Gas Odorizing was located in Tulsa. The firm's headquarters are in Houston.

PEOPLE

JACK D. SPARKS has been named sales promotion and advertising manager for Whirlpool Corp., St. Joseph, Mich. He has been on a special assignment in the defense contracts division for the past year and was advertising manager prior to that. DONALD H. DAVIDSON, who has been acting advertising manager, will now resume his duties as sales promotion manager of the dryer and ironer division.

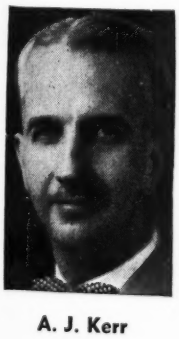
Other personnel changes include: JOSEPH E. CONROY, regional sales manager in the Northeast; LEE LESTER FRANK, directing sales for the west central territory; ERNEST KELLER, central territory; and PAUL LA ROCHE, eastern territory.

After 41 years and nine months service with Hope Natural Gas Co. and associated companies, JOSEPH C. CHISLER, senior vice president, has retired from the Clarksburg, W. Va. firm. Mr. Chisler began his career with Hope as a general clerk in the treasurer's office, subsequently serving as paymaster, field supervisor, and assistant treasurer and director. In 1937 he was elected vice president, treasurer, and director of Hope Natural Gas and several associated firms, resigning as treasurer in 1948 to devote his time to duties as vice president.

HAROLD B. SCHUM, president of the River Gas Co., Marietta, Ohio, has also retired after 41 years and nine months with Hope and associated companies. He has served as traffic manager, secretary-treasurer, commercial manager, before his appointment to the presidency of River Gas.

Gar Wood Industries Inc., Wayne, Mich. has announced the appointment of H. H. HIPPLER as assistant director, sales and advertising. R. F. WHITWORTH, formerly sales manager of national accounts, succeeds Mr. Hippler as manager of Gar Wood's branch division.

ROSS MILLER, former manager of the firm's Chicago factory, has been named vice president and general manager of National Life Co., Gar Wood subsidiary.



A. J. Kerr

L. A. Dixon Sr.

A. J. KERR, vice president, meter and valves sales, Rockwell Manufacturing Co., Pittsburgh, has resigned his position to organize his own firm to develop and sell products to the oil and gas industry. Associated with Rockwell for 25 years, Mr. Kerr is a graduate of Carnegie Tech and was formerly a director of the ASME.

Rockwell has announced the election of L. A. DIXON SR. and J. E. ASHMAN as executive vice presidents. Mr. Dixon has been vice president of the company's meter and valve divisions. Mr. Ashman has served as controller and vice president. In his new position, he will be in charge of the power tool and Rockwell Register divisions of the firm.

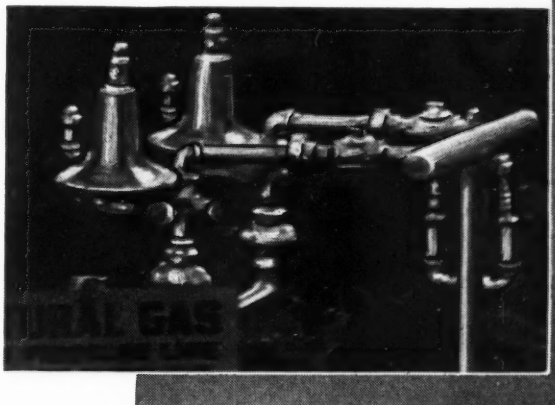
RICHARD SMITH of Indianapolis has succeeded the late JOHN E. TEGARDEN as president of Jet Combustion Inc., Chicago. MRS. JOHN E. TEGARDEN has been named executive vice president; RICHARD KELLY, vice president in charge of engineering; STEVE KUPRES, vice president in charge of field operations; and CLYDE TEGARDEN, secretary and treasurer.

Retiring after serving in executive capacities with Commonwealth Services Inc. since 1920 is RALPH S. BELL, director of merchandising consultation. Creator of numerous merchandise sales campaign and compensation techniques adopted in the electric and gas appliance fields, Mr. Bell aided in developing a sales program which outstripped all public utility groups in the nation in setting new sales records during the depression years.

In line with its expansion program, Cribben & Sexton Co., Chicago, has named J. G. SCHELLENBERG manager of the new central division. New representatives are WILLIAM C. NEUENFELD, Wausau, Wis., covering the Michigan City, Ind. territory, and C. ED-

A WIDER RANGE

... of Delivery Pressure Control



REYNOLDS HIGH PRESSURE LINE REGULATORS in parallel hookup have an increased range of capacity as well as a wider range of delivery pressure control. This also provides greater margin for emergencies. On inlet pressure the range is up to 650 pounds. For outlet pressure, this unit assures absolutely accurate and dependable control from 2 to 100 pounds. This variance in outlet pressure is made by use of different sizes of diaphram cases and further flexibility in the spring type is possible by use of different strength springs.

BRANCH OFFICES

H. D. "MIKE" MEUFFELS
423 Dwight Building
Kansas City, Missouri

SEIDENGLANZ & CO.
2nd Unit, Santa Fe Building
Dallas, Texas

REPRESENTATIVES

EASTERN APPLIANCE COMPANY
Boston, Massachusetts

WALDO S. HULL
163 W. Queen Lane
Philadelphia, Pennsylvania

Reynolds Gas Regulator Co.
ANDERSON, INDIANA, U. S. A.

GAS CONTROL SINCE 1892

ARCCO

ARCCO... NOW OFFERS 8 DAY CHARTS and ROCKWELL CHART DRIVES

EIGHT-DAY ARCCO CHARTS are now available for use on practically all Rockwell-Emco, Foxboro and Westcott orifice meters. Eight day charts for other instruments soon available.

With this NEW Chart Drive 11 rotation speeds are possible. Turrets are available for 2, 3, 4, 6, 8 and 12 hours, also for 2, 3, 7, and 8 day rotation. Standard hub gives 24 hour rotation.

ROCKWELL CHART DRIVES are ruggedly built and are sealed for years of trouble-free service. The drives are adaptable to practically every type of instrument using circular charts. The price is $11.55 each. Turrets are $3.85 each F.O.B. Los Angeles Calif. or Tulsa, Oklahoma.

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MOND YINGLING, Granville, Ohio, covering the Columbus territory.

JOHN H. HAYES is the new personnel director for Equitable Gas Co. and affiliated companies, succeeding the late SAMUEL E. CLANEY. Since 1936 when he joined the company, Mr. Hayes has been cadet engineer, junior engineer, fieldman, assistant distribution engineer, and assistant personnel director. He has held the latter position since May 1950.

J. H. Hayes
Equitable Gas

J. D. Van Norden
American Meter

JOHN D. VAN NORDEN has joined the Atlanta sales territory of American Meter Co., New York, as sales representative. He recently completed a period of factory training designed to acquaint him with the company's complete line of displacement meters, regulators, orifice meters, and allied instruments. He was formerly associated with United Engineers & Constructors Inc.

N. HENRY GELLERT, president of the Seattle (Wash.) Gas Co., was elected vice president and a member of the board of the United Defense Fund Inc. at its annual meeting in New York. The organization finances the USO, American Relief for Korea Inc., and other such welfare services.

GEORGE G. DORMER has been appointed assistant chief engineer of the Manufacturers Light & Heat Co. and associated Pittsburgh Group gas companies in the Columbia Gas System. Since 1948 Mr. Dormer had been the assistant superintendent of the group's production-transmission Div. 7 with headquarters in Binghamton, N. Y.

The election of RALPH T. MCELVENNY as executive vice president of American Natural Gas Co. and JOHN DERN as general counsel has been announced. Mr. McElvenny had been financial vice president and assistant to the chairman since 1945 and Mr. Dern is a director of the company and its subsidiaries.

WILLIAM H. NIX JR. has resigned from the Pennsylvania & Southern Gas Co., Westfield, N.J. to join Ford, Bacon, and Davis, an engineering firm. His duties will be assumed jointly by H. EMERSON THOMAS, president of the gas company, ERIC TINNEY, a director, and GEORGE R. WILLIAMS, secretary.

The newly created position of field promotion specialist in the Hamilton Manufacturing Co. organization is being filled by

W. G. Baustert

J. P. Morgan

WILLIAM G. BAUSTERT. His activities will be national in scope and designed to supplement the work of regional representatives with regard to special promotions and sales training. He will headquarter in Kansas City.

JOHN P. MORGAN has succeeded Mr. Baustert as sales representative in the west central region. He will cover the Midwest and West Central states for the Two Rivers (Wis.) firm operating out of St. Louis.

C. H. RIPPE, sales director of Hamilton's home appliance division, has resigned to join Gordon Wilkins-Ironers Inc., San Francisco, California distributors of Hamilton dryers.

Blaw-Knox Co., Pittsburgh, has elected W. C. SNYDER JR. chairman of the board of directors. Mr. Snyder already serves as president and chief executive officer of the company.

JAMES H. CLARK has been named assistant general manager of the Hoyt Heater Co., Los Angeles. He was succeeded as sales manager for the company by CHARLES LOMBARDO, former plant supervisor.

C. S. DUFFIELD has retired from United Fuel Gas Co. where he has served as purchasing agent since 1915. He started with the Charleston, W. Va. firm in 1910 as secretary to the general manager.

HOWARD S. BUNN has been appointed president of Bakelite Co., a division of Union Carbide & Carbon Corp., New York. Mr. Bunn has been vice president of Bakelite and Carbide & Carbon Chemicals Co., both divisions of Union Carbide.

CAPT. E. S. PETTYJOHN, director of the Institute of Gas Technology, Chicago, has been appointed vice president of the institute in recognition of his contributions to the school's advancement in the fields of research and education. Other appointments made at the 29th meeting of the executive committee of the board of trustees included DR. J. D. PARENT as dean of the institute and HENRY R. LINDEN and C. G. VON FREDERSDORFF as assistant research directors.

KEITH KELSEY has been named assistant vice president of the Southern California Gas Co., Los Angeles. In his new position, Mr. Kelsey will participate in the company's pending rate case and other related activities. He has served for the past several years as executive vice president of the American Institute of Management, a group organized to investigate and evaluate methods and practices in corporate management and to study management and related financial and economic problems.

R. E. Montgomery

As field supervisor for Drake & Townsend, New York, ROBERT F. MONTGOMERY will supervise installations of Draketown propane plants in the middle west, operating out of Centralia, Ill. Formerly general operating manager of Acme Gas, Evansville, Ind., Mr. Montgomery has had wide experience in the heating equipment industry as supervising engineer of construction of bulk storage and bottling plants. Other affiliations include Oklahoma Natural Gas, Southern Union, and Cities Service.

JOHN V. POSTLES has retired as vice president in charge of production of The Philadelphia (Pa.) Gas Works Co. after 38 years with the company. In 1914 he was transferred from United Gas Improvement Co. to the Philadelphia Gas Works, serving

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as assistant foreman in its distribution department. After serving in various engineering capacities he became engineer of works in 1938, a position he held until his election as a vice president in 1947.

LELAND B. BONNETT, vice president of the Consolidated Edison Co. of New York Inc., was elected president of the Brooklyn Bureau of Social Service and Children's Aid Society in June. For a number of years he has been a member of the welfare organization's board of directors.

Mississippi Valley Gas Co., which recently acquired the gas distribution system of the Mississippi Power & Light Co. in 52 Mississippi communities, has named J. HARRY LAMBDIN of Jackson as chief engineer.

Koppers Co. Inc., Pittsburgh, has appointed R. D. KING to the position of departmental vice president. Procurement department manager since 1946, Mr. King joined Koppers in 1920 serving as a buyer, assistant purchasing agent and purchasing agent.

New district sales manager of the New York area for American Car & Foundry Co. is THOMAS C. BALLOU. Mr. Ballou will be in charge of railroad car and miscellaneous sales in New York, New Jersey, New England, and eastern Canada.

MARVIN M. RAMER has been promoted to contract manager at the southwest division of the chemical plants division, Blaw-Knox Co. Mr. Ramer, headquartering in Tulsa, will have charge of all contract preparations and will assist in contract negotiations for the engineering, procurement, and construction activities in his division.

E. E. Hawley

E. E. HAWLEY is the newly elected president of the Gasair Corp., which became a partially-owned subsidiary of the Pacific Gas Corp., New York, when PGC purchased the controlling interest in May. Mr. Hawley is also a vice president of Pacific Gas, specialists in L.P. gas systems. He will head the San Francisco office and the Gasair direct-fired vaporizing and air-gas mixing equipment operations. According to Mr. Hawley, PGC's acquisition of Gasair substantially strengthens PGC's position in the liquefied petroleum gas field.

The appointment of W. D. LEVIE as technical advisor to A. W. LUNDQUIST, plant manager, has been announced by Koppers Co. Inc., Pittsburgh. Succeeding Mr. Levie as production superintendent of the St. Paul, Minn. coke plant is JESS H. BROWN, assistant production superintendent since 1942.

New chief geologist for The Peoples Natural Gas Co., Pittsburgh, is ALBERT I. INGHAM. Prior to joining Peoples in 1951, Mr. Ingham was geologist in charge of southwestern Pennsylvania for the Pennsylvania Geological Survey and had served in a similar capacity for Shell Oil Co. in Texas, Louisiana, and Florida.

Obituaries

WILLIAM J. SERRILL, 89, retired head of the planning department of the United Gas Improvement Co., Philadelphia, died recently. Mr. Serrill joined United Gas in 1885 and held various executive posts until his retirement in 1929. He had been president of the American Standards Assn. and of the Illuminating Engineering Society of New York City.

DOUGLAS STEWART, supervisor of safety for the Niagara Mohawk Power Corp.'s entire system, died recently after a brief illness. One of the outstanding men in the field of utility safety, Mr. Stewart had served with the National Safety Council, the AGA, and the ASA.

R. B. BROWN, former president of the Milwaukee (Wis.) Gas & Electric Co., died May 20 in Bellingham, Wash. Mr. Brown, 80, had headed utilities in Michigan and Wisconsin prior to his retirement from business in 1939.

CHESTER J. MCMAHAN, 60, superintendent of production for the Pittsburgh group of the Columbia Gas System, died May 6 in Washington, Pa. Mr. McMahan started his career with the Manufacturers Light & Heat Co. in 1911; in 1928 he became a division superintendent; and in 1930,

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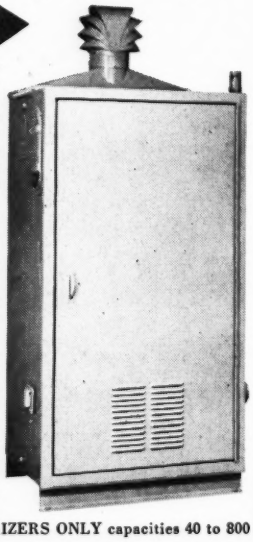

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No electricity or water needed for operation. A steam vaporizing unit can be supplied where steam is available.
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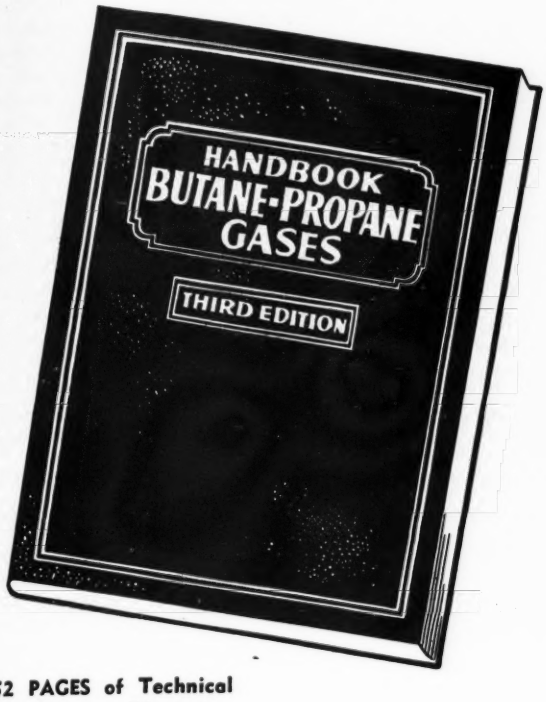

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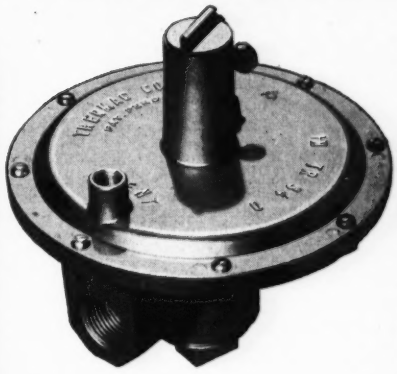

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COMPANY

"20 years experience in building gas controls."

Columbia's Pittsburgh group made him assistant superintendent of production and in 1934, superintendent of production.

D. M. McCUNE, 78, a retired official of Natural Gas Co. of West Virginia, died in June. He had been a district manager of the company for 25 years and at one time served in its Pittsburgh office as distribution manager.

CLARENCE C. RAUSCH, assistant vice president and manager of rust preventive sales, Dearborn Chemical Co., died in April at the age of 57. He had been with the Chicago firm for 32 years.

KERIEN L. FITZPATRICK, manager of public relations and advertising of the Dayton Power & Light Co., Dayton, Ohio, died in May. Mr. Fitzpatrick, 60, joined DP&L in 1912 as a salesman and was later manager of the gas and electric shop and sales promoton manager.

GAS CLASSIFIED

Classified advertising is set in 6-point type, without border or display, at the rate of 15 cents per word per insertion; minimum charge per insertion $3. Box numbers for replies count as 5 words. Count as a word each one letter word and each group of figures. Classified advertising is only accepted when payment accompanies order. Copy and payment must reach publisher's office prior to 10th of month preceding publication.

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TRADE LITERATURE

HANDLEY-BROWN HEATER CO., 2500 Brooklyn Rd., Jackson, Mich.—A bulletin issued recently describes the Poly-Trol automatic safety shutoff valve now being manufactured by the company. The new safety valve, which can be installed without cutting pipe, protects against both over-pressure and excessive temperature hazards. (For a description of Poly-Trol, see March *GAS*, pages 80 and 82.)

INTERNATIONAL SALES CO., 2045 Evans Ave., San Francisco 24, Calif.—Two bulletins published recently by this company are an Instruction Booklet and Parts List, No. F9A, and a folder on ceiling heating units. The former is in regard to the manufacturer's series of gas-fired forced warm air furnaces, and the latter describes Western suspended ceiling unit heaters for industrial and commercial heating.

TENNESSEE EASTMAN CO., Kingsport, Tenn.—A new book, "Fittings for Pipe Extruded of Tenite," contains detailed diagrams and descriptions of methods of fabrication and installation of various fittings from extruded pipe lengths. It also discusses molded Tenite fittings and special couplings, of Tenite or metal, approved for joining Tenite to metal pipe.

PLIBRICO JOINTLESS FIREBRICK CO., 1800 Kingsbury St., Chicago 14—A new refractory bulletin entitled "Plibrico Refractory Products for Firebox & Other Heating Boilers" covers the application of Plibrico monolithic linings to firebox and similar heating boilers. It contains specifications for various types of construction, including "Multi-Rib" steel base, air-cooled or solid refractory.

MINE SAFETY APPLIANCES CO., Braddock, Thomas & Meade Sts., Pittsburgh — Bulletin No. 0705-1 describes the company's infra-red gas and liquid analyzer designed for rapid automatic analysis of fluid mixtures, precise control of either continuous or batch-type processes, and accurate measurement of toxic contaminants in atmospheres. The bulletin, fully illustrated, is available upon request.

BUCYRUS-ERIE CO., So. Milwaukee, Wis. —A 32-page booklet has been published giving time-tested rules of excavator and crane operation and maintenance together with information on operation, lubrication, adjustment, and preventive maintenance. The illustrated, 2-color booklet is titled "Ways to Make Your Excavator Work Harder—Live Longer" and is available upon request.

ILLINOIS TESTING LABORATORIES INC., 420 N. LaSalle St., Chicago—A new temperature control unit, the Alnor Pyrotac, is fully described and illustrated in a 7-page bulletin. The control automatically monitors up to 20 individual temperature points a minute, gives instant and accurate readings on temperature variations within any phase of heat processing, and can be used in almost any operation where heat is involved.

GAS PIPELINE NEWS AND FEATURES

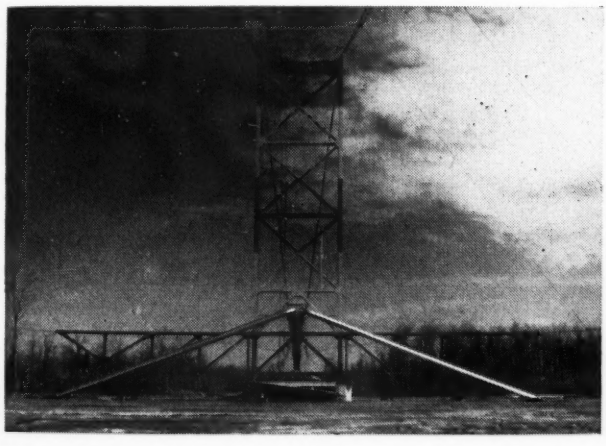
UP AND OVER GO UNITED GAS LINES

The ever-widening use of pipeline suspension bridges is well illustrated in the current multi-million-dollar expansion program of United Gas Pipe Line Co. No less than five major overhead spans are under construction or have recently been completed by the Shreveport transmission company. When all are in service, United Gas will have a total of eight major overhead crossings in service.

On this page are photographs of three of the highly photogenic new structures. Not shown are the "upper Brazos" crossing, located five miles west of Rosenburg, Texas, and the Pearl river span near Hopewell, Miss. The former is third in size, having an 800-ft span, and is designed to carry two 30-in. lines. The Pearl river crossing, with a 500-ft span, carries a section of the new line running from the Gulf of Mexico waters to Kosciusko, Miss.

Courtesy *United Gas Log.*

RED RIVER. Massive 160-ft steel tower supports one end of crossing at Grand Ecore, near Natchitoches, La., along Agua Dulce-Monroe line. Largest of the five, its main span measures 1520 ft, with a back span of 760 ft on north shore. Center is 50 ft above high water. More than 3000 yds of concrete went into foundations and anchor blocks for the seven 19-strand cables.



LOWER BRAZOS. On the Magnet-Withers to Houston line, five miles below Richmond, Texas, this 960-ft span carries two 24-in. lines side by side.

COLORADO RIVER. Over-and-under pattern of two 30-in. lines marks crossing a few miles south of Wharton, Texas. The 720-ft main span links sections of the Magnet-Withers-to-Houston line and the new 30-in. west leg. (Photos at right).

You can depend on Crose for all of your pipeline equipment needs.

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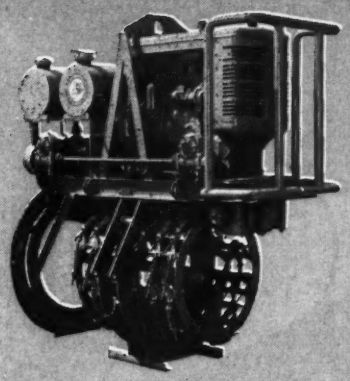

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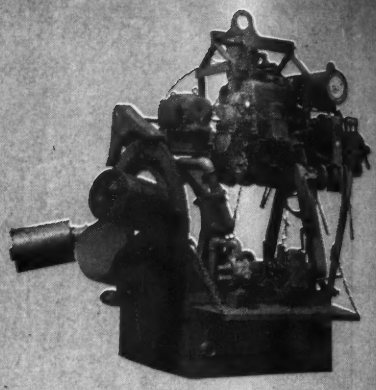
Line traveling, rugged and dependable, equipped with dual multi-speed transmissions providing greater flexibility of control. Interchangeable cleaning and priming assemblies permit each model to process a wide range of pipe sizes. Model M handles 3" - 14" pipe, Model K handles 16" - 26" pipe, Model R handles 30" - 31" pipe.



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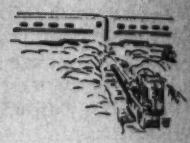

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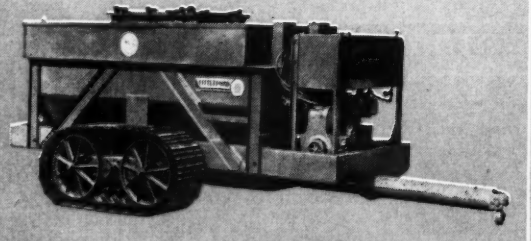

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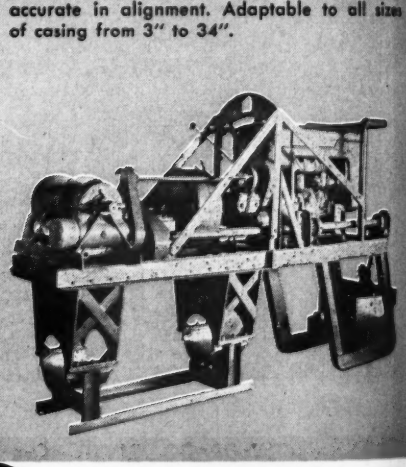

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VARIABLE-SPEED HYDRAULIC DRIVES FOR FAN-TYPE COOLING UNITS

A discussion of their applications and advantages.

By C. R. TAYLOR

Rockwell Manufacturing Co.
Pittsburgh

THE field-proven application of Rockwell hydraulic variable speed drives on Fin-Fan cooling units for gas compressor stations has resulted in their selection as standard equipment by a number of gas companies who are interested in obtaining the advantages of operation and power saving such an installation affords.

Exclusive

Various methods of "power take-off" and variable speed devices for operating compressor station auxiliaries have been tried in the past but they have lacked the complete flexibility in operation and simplicity of automatic control which can be accomplished through the use of positive displacement hydraulic units.

Direct-Connected Motor

The hydraulic transmission consists basically of a pump driven from the compressor flywheel which furnishes power oil to a hydraulic motor direct-connected to the fan on the Fin-Fan cooling unit.

While the conservation of power realized from the operation of compressor station auxiliaries with hydraulic drives is considerable, there are additional features which may be even more attractive to operators.

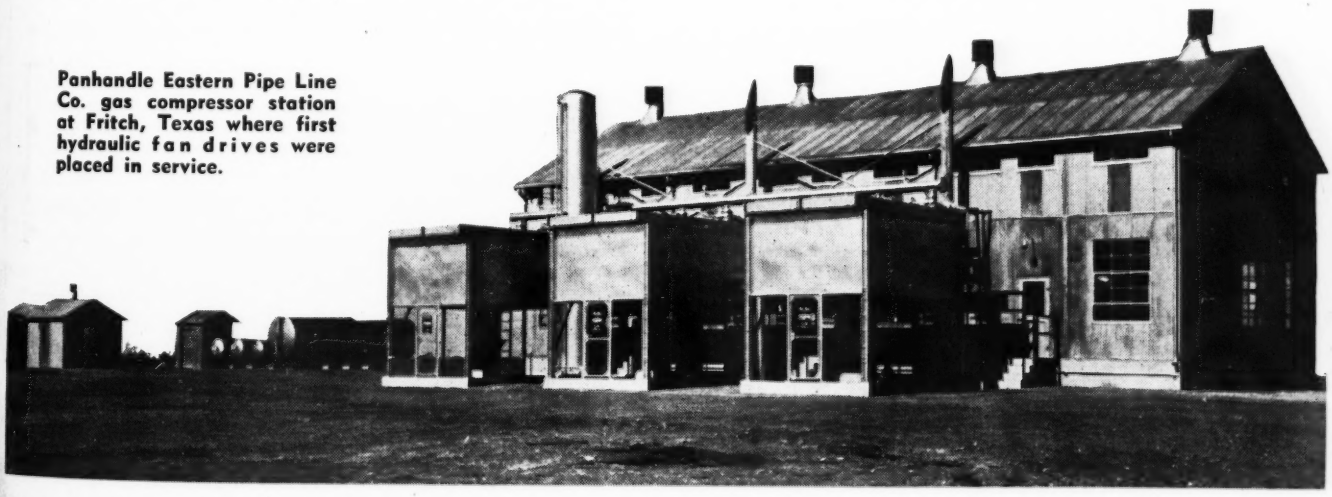
Precise automatic control of jacket water temperature results from variable fan speed. Predetermined water temperature is maintained with varying ambient air temperature through the use of a temperature controller actuated directly from a temperature bulb located on the downstream side of the cooler. The temperature controller actuates a diaphragm-operated pressure regulating valve which by-passes excess oil and regulates fan motor speed. Water temperatures can be controlled within plus or minus 1° F automatically, which is particularly advantageous in the operation of remotely located, unattended stations.

Controlling the water temperature through the adjustment of fan speed insures full flow of water through the cooling coils at all times; and eliminates the necessity of by-passing the water at the cooler which minimizes the hazard of frozen coils in cold weather.

Although other methods of compressor "take-off" drives are in use, there have been some instances where recycling of warm air has been encountered. This is due to the necessity of locating the Fin-Fan units directly adjacent to the compressor building in order that the distance between the driver and driven mechanism might be held to a minimum. With positive displacement hydraulic transmission, the Fin-Fan units can be located at any desired distance from the compressor building, insuring a free flow of air across the cooling coils.

Savings

With the cost of installed horsepower continually increasing, the selection of a hydraulic transmission resolves to pure economics. The elimination of the expense of providing an additional building, needed to house hazardous electric generating equipment where power line facilities are not available, results in reduced initial investment and maintenance cost. Basically, the conversion of gas energy directly to non-hazardous hydraulic power with its inherent flexibil-



Panhandle Eastern Pipe Line Co. gas compressor station at Fritch, Texas where first hydraulic fan drives were placed in service.

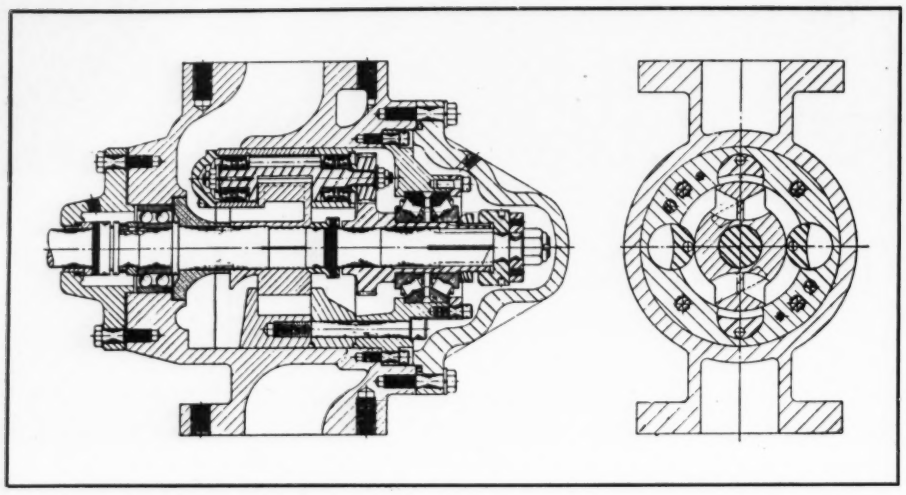


Fig. 1. Assembly and dimensional drawing of series 500 Rotocycle hydraulic unit.

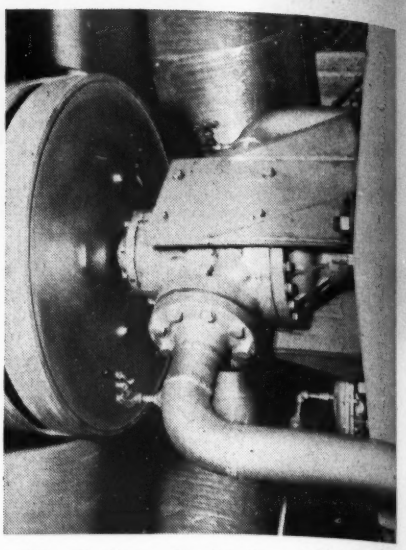


Fig. 4 shows the hydraulic motor, mounted in a vertical position and direct-connected to the fan.

ity, and with the minimum of maintenance that results from a self-lubricated system, appears to be the most simple method of safely operating station auxiliaries.

Types of Installations

Several types of installations are at present in service. In one type the fan unit only is operated hydraulically, while in the others several additional auxiliaries, such as the jacket water pump and lube oil coolant pump, are driven from the main oil pump.

Some operators are desirous of integrating compressors with their auxiliaries, particularly where fluctuation in gas supply on a transmission system is to be expected after a period of operation. This affords the opportunity of removing a complete compressor unit including auxiliaries at a location where gas supply has decreased, and re-installing the unit at another position on the line where more compressor horsepower is required. Such a move does not interfere with the operation of the remaining compressors in either station.

The integrated system also affords economical operation where only a portion of installed compressor horsepower is required, as is the case when pumping to storage.

Another type of installation applied is where the jacket water of a battery of compressors may be cooled by two or three Fin-Fan units in parallel. In such an installation, each compressor furnishes through a power pump a proportionate amount of the horsepower required to drive the fans.

Where two mediums such as water and gas are to be cooled, a constant pressure bus line is installed, and each fan is independently controlled with regard to speed from the medium which is flowing through that particular Fin-Fan unit.

The success which has accompanied the use of Rockwell hydraulic transmissions lies in the Rotocycle principle of operation, which is unique in comparison with existing designs in this class of devices in that there is no reciprocating motion imparted either to the mechanical parts or to the hydraulic medium. This results in a smooth, constant torque output curve which reaches maximum at "stall condition," and, consequently, can operate with high efficiency at the slow speeds encountered when the units are direct connected to large diameter fans.

Combined Units

Fig. 1 is an assembly and dimensional drawing of the Series 500 Rotocycle hydraulic unit which is applied both as pump and motor, a combination of two units comprising a positive hydraulic transmission.

The design consists basically of four rotating vanes mounted on anti-friction bearings with controlled clearances be-

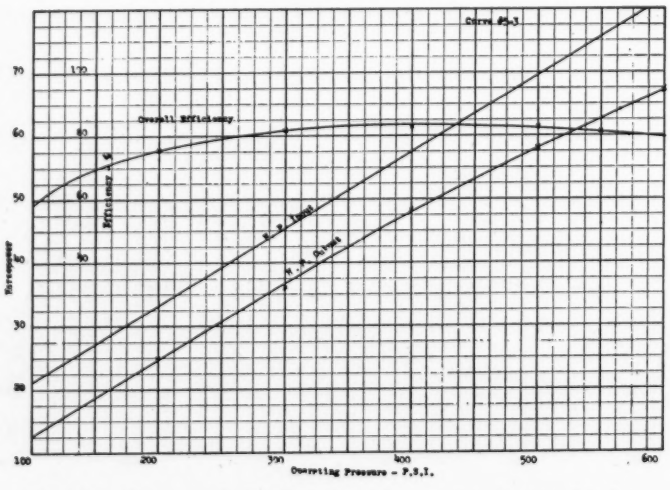


Fig. 2. The overall efficiency and horsepower transmitted by a series 500 transmission. Both units operating at 1150 rpm.

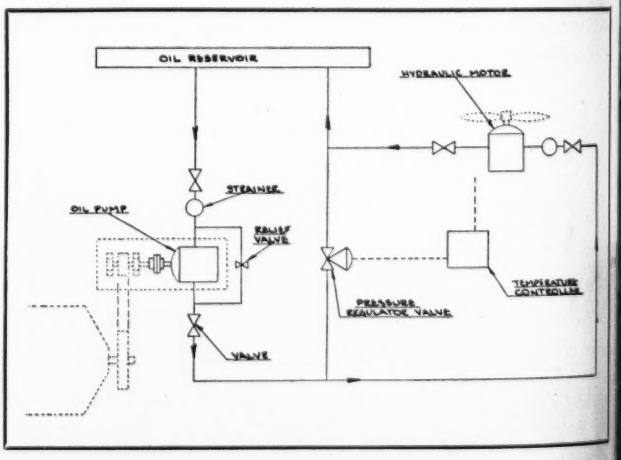
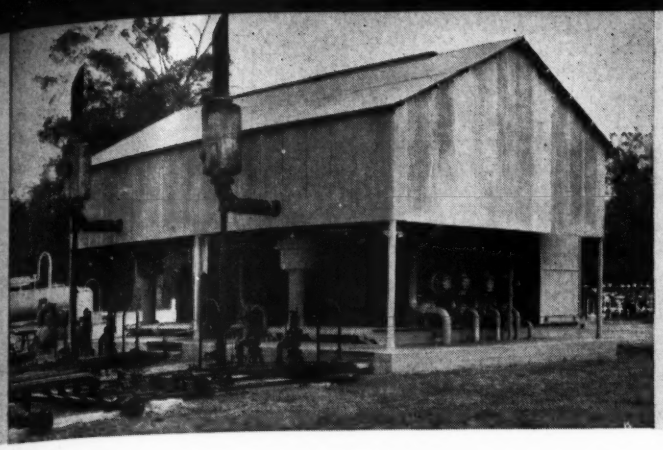
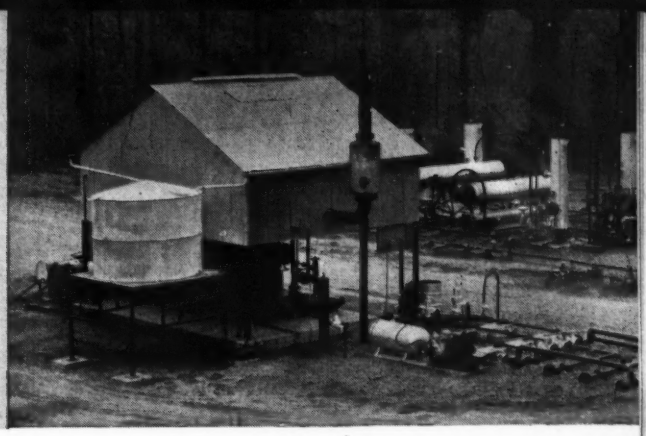


Fig. 3. Schematic diagram of a typical installation for automatic speed control of the fan.



Battery Four in Lake St. John Field, La.: Two Clark Midget Angles furnishing gas for gas lift services and for gasoline plant at nearby Lake St. John.



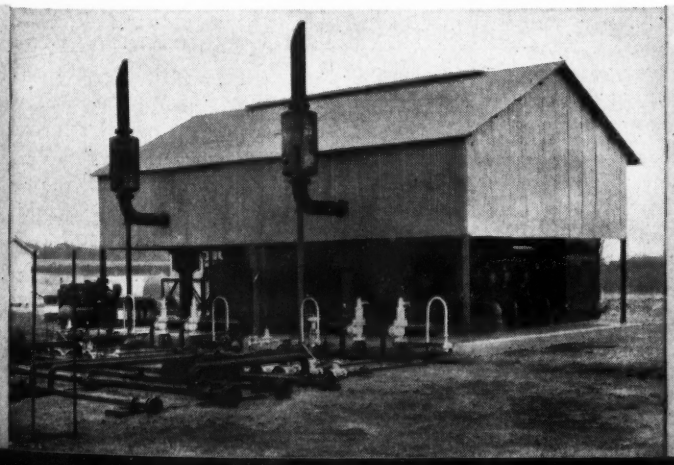
Clark Midget Angle handling 2-pressure services of field gas for Cranfield, Miss. recycling plant.

Stamina

Delta Farms, in Bayous of Louisiana: Two Clark Midget Angles operating on individual floating barges. Perfect balance makes this possible.

CLARK® compressors

Two Clark Midget Angles supplying gas through 2-pressure services to nearby Lake St. John recycling plant.



Hico Knowles, La.: Clark Midget Angle supplying gas through 2-pressure service for nearby recycling plant.

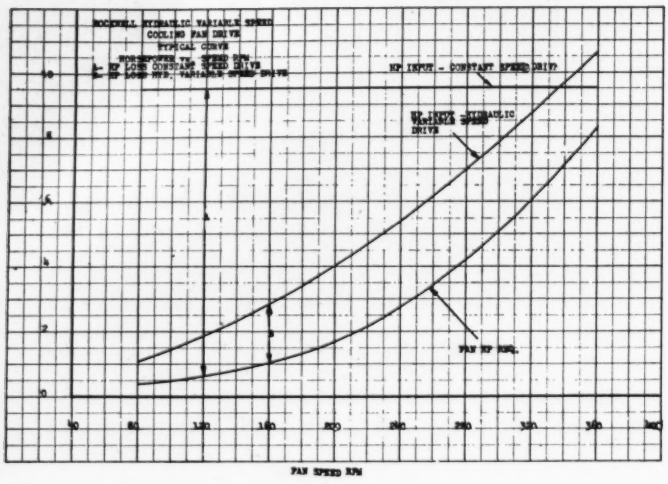


Fig. 5. Horsepower savings on a typical, single fan installation with power pump direct-connected to the compressor. Operating speed: 300 rpm.

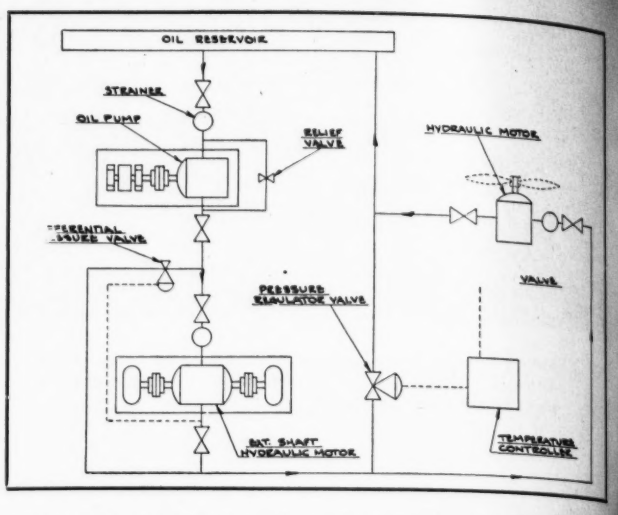


Fig. 6. An installation where the centrifugal jacket water pump and lube oil coolant pump are powered by a double extended shaft hydraulic motor in series with fan system.

tween all rotating parts. The vanes are timed through gears to withdraw into the recess to allow passage of the rotor division plates. As there is no resistance to the turning of the vanes, there is, consequently, no load on the timing gears other than that required to turn the vanes in the vane recess. With all parts turning on anti-friction bearings, high mechanical efficiency results. The unit is balanced both radially and axially, and main bearings are subjected to minimum loading beyond that imposed directly by the fan thrust.

Fig. 2 shows the overall efficiency and horsepower transmitted by a Series 500 transmission with both units operating at 1150 rpm. The selection of proper unit displacement and oil viscosity results in maximum overall efficiency of a transmission for any desired speed within unit speed range.

Automatic Speed Control

Fig. 3 is a schematic diagram of a typical installation for automatic speed control of the fan. The pump is either direct connected to the compressor flywheel through a stub shaft or is belt driven through a jackshaft arrangement, the type of mounting depending on the pump speed required to develop the specified horsepower. The hydraulic motor is mounted in a vertical position, and is direct connected to the fan as shown in *Fig. 4*. Speed variation of the fan as required to maintain predetermined jacket water temperature with changing ambient air temperature is obtained through the temperature controller, which positions the diaphragm operated regulating valve, by-passing the excess oil not required at a continually reducing pressure as fan speed is decreased.

Horsepower Savings

Fig. 5 shows horsepower savings instituted on a typical single fan installation with power pump direct connected to the compressor, and operating at a speed of 300 rpm. The hydraulic motor is direct connected to the fan, and operates at a maximum speed of 360 rpm. In this particular installation, the fan required 8.3 hp at maximum speed, while the brake horsepower input to the pump under above fan requirements was 10.6 hp, resulting in an overall drive efficiency of 78.5%. It will be noted that the overall efficiency of the constant speed mechanical drive, electric motor, and gear reducer is slightly higher than the hydraulic drive under maximum conditions; however, the input horsepower to the mechanical drive remains constant while the fan horsepower required decreases approximately as the cube of the speed.

The input horsepower loss, therefore, is considerably reduced with the variable speed hydraulic transmission over fan speed range, as the maximum design condition for 100° ambient air exists only a small percentage of the operating time.

While overall transmission efficiency at maximum fan speed is a factor, it appears more important in compressor station efficiency that the average horse-

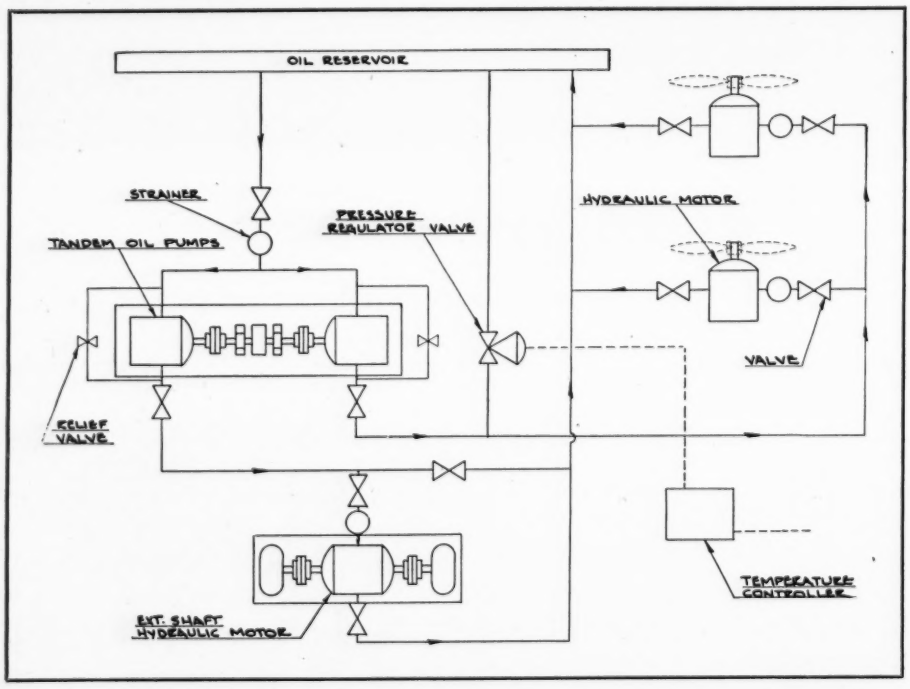
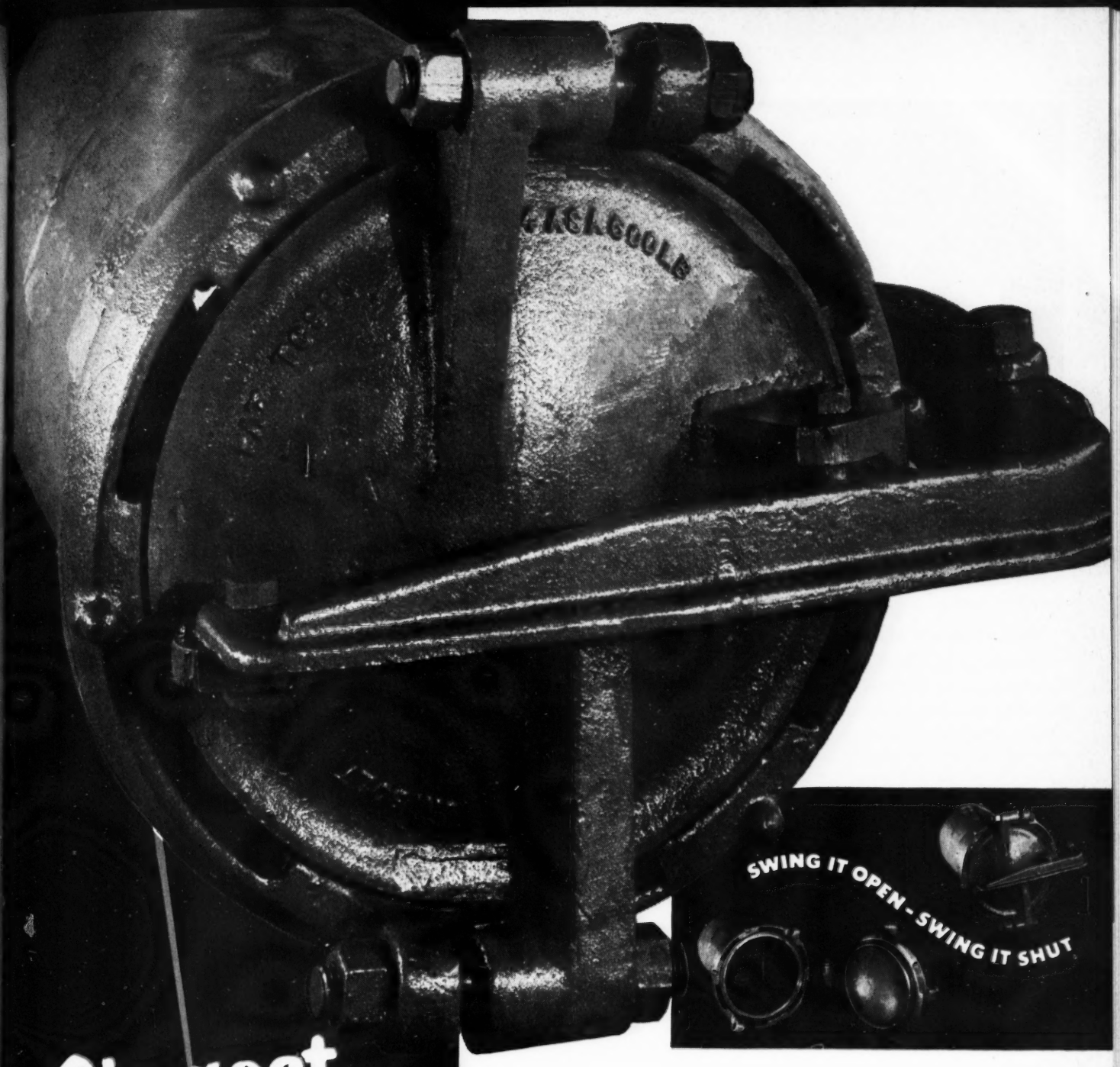


Fig. 7. Schematic diagram of a tandem pumping unit sometimes used instead of placing the water pump motor in series with the fan motor.



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These simple, convenient closures are equally desirable for gas line blowdowns, strainers, terminal manifolds, or any other service where pressure vessels must be opened for inspection, cleaning, repairing, connecting to a line, etc.

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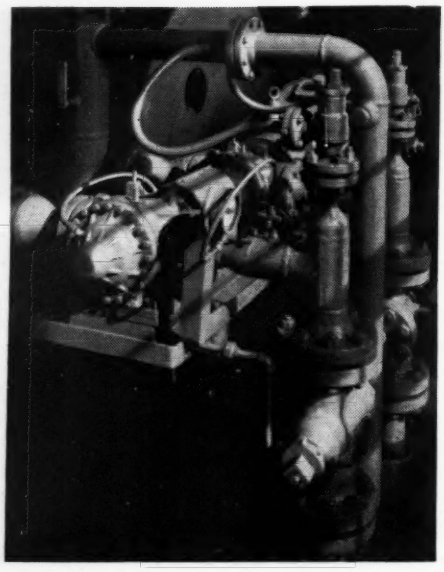
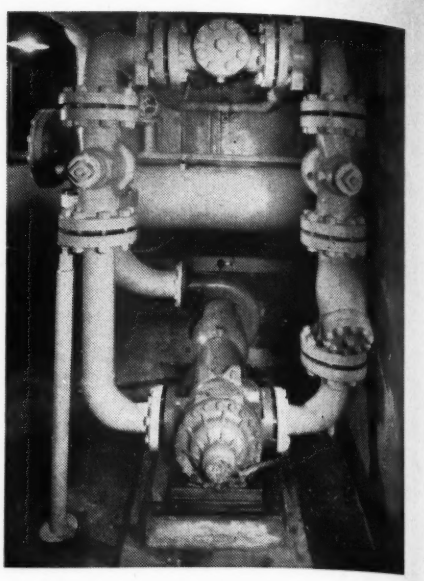
UNIBOLT SCRAPER TRAP





Figs. 8 and 9 show installations of Nordstrom lubricant-sealed valves on various lines at Transcontinental's mainline hydraulic station.

power loss be held to a minimum as fan horsepower requirements vary with ambient air temperature.

Variations of Hydraulic Drive

A number of variations of the hydraulic drive can be installed, where it is desired, to cool both water and gas at different temperature levels, or where it is desired to operate other auxiliaries in addition to the fan from the main oil pump.

Fig. 6 covers an installation where the centrifugal jacket water pump and lube oil coolant pump are powered by a double extended shaft hydraulic motor operated in series with the fan system. The water pump drive motor is designed to operate at desired speed with the equivalent amount of oil required to drive the fan at maximum speed.

As compressor speed varies and centrifugal water pump speed must remain constant, a differential pressure regulating valve, therefore, is installed across the water pump motor to maintain the required differential pressure for a given speed. Fan speed is controlled, as in the single fan installation, by the operation of the pressure regulating valve located downstream from the water pump hydraulic motor, the valve being positioned as previously by a temperature controller.

Let us assume that the fan requires 15 hp at maximum speed of 385 rpm; that to produce this horsepower, 85 gpm of oil is required at 300 psi at maximum fan speed; and that it is also required to develop 12 hp at 1450 rpm. A differential pressure of 242 psi across the water pump motor is then required to maintain speed and produce the 12-hp output required.

Main oil pump discharge pressure will then vary from a minimum of 242 psi when fans are stopped and temperature-controlled regulating valve located on discharge of water pump motor is open, to a maximum of 542 psi when regulating valve is closed and fans are operating at full speed.

Tandem Pumping Unit

Where it is not expedient to place the water pump motor in series with the fan motor because of horsepower requirement and high pump operating pressures, a tandem pumping unit as shown in schematic diagram *Fig. 7* is installed. In such an installation, one pump operates the water pump motor at constant speed and pressure; the other operates the fan motor at variable speed and pressure, both pumps being connected to common oil sump tank.

As the Rotocycle mechanism is basically a high volume low pressure instrument, standard piping and fittings can be used throughout the hydraulic system. Operating pressures range between 200 and 550 psi at maximum fan conditions.

The Series 500 unit as shown in *Fig. 1* is capable of driving fans direct connected up to a maximum of 20 hp at normal fan speeds of 250 to 300 rpm. The Model No. 8 is used on large diameter fan applications requiring from 30 to 60 hp at fan speeds of 200 rpm.

Actual Installations

The first Rockwell hydraulic fan drives were placed in service by Panhandle Eastern Pipe Line Co. at Fritch, Texas on Jan. 15, 1951. This was a booster station employing three 800-hp compressors.

In this particular installation, the pumps were direct driven from the compressor flywheel at 300 rpm, and the fans were mounted directly on the shafts of the hydraulic motors.

The following April, Transcontinental Gas Pipe Line Corp. placed in service its mainline hydraulic station at Ellicott City, Md., where seven 1600-hp compressors are installed. In this installation, a tandem pumping unit was installed on each compressor, one pump driving the fan motor requiring 60 hp at maximum speed, the other driving the water pump hydraulic motor requiring 30 hp at maximum speed. To produce the 90 hp required, the tandem pumping unit was driven at 1150 rpm from the compressor flywheel through a geared speed increaser. In this particular instance, the fans were driven through geared speed reducers.

As shown in *Figs. 8* and *9*, a number of Nordstrom lubricant-sealed valves have been installed on various lines at Transcontinental's station.

Since that time, Panhandle Eastern has added four more hydraulic stations, three of which are mainlines.

New York State Natural Gas Co. is, at present, installing two hydraulic fan drives incorporating the large Model No. 8 fan motors at the Oakford station. The pumps in this case are being driven directly by electric motors; and the fans requiring 46 hp at maximum speed of 234 rpm are direct connected to the hydraulic motor.

El Paso Natural Gas Co. is at present completing construction on three stations with a fourth on order. These represent two other types of installations. In the one, both water and gas are being cooled, the pump being driven by a separate gas engine. Fan speeds are independently controlled. In the other type, a single pump unit is furnishing hydraulic power for the jacket water pump, and lube oil coolant pump—in addition to the fan motors for each compressor.

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Pipe coated and wrapped by Hill, Hubbell is insurance against unnecessary maintenance expense.

Hill, Hubbell protected pipe lasts longer because we have absolute control over every step of the process. First the pipe is cleaned metal-bright with Roto-Grit Blast. All coatings and wrappings are precision applied at uniform temperatures. Every length is inspected with electronic holiday detectors before leaving the factory.

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Pressure Control Equipment Designed For Use on 16-in. Gas Pipelines

By PAUL WRIGHT
El Paso Natural Gas Co.
El Paso, Texas

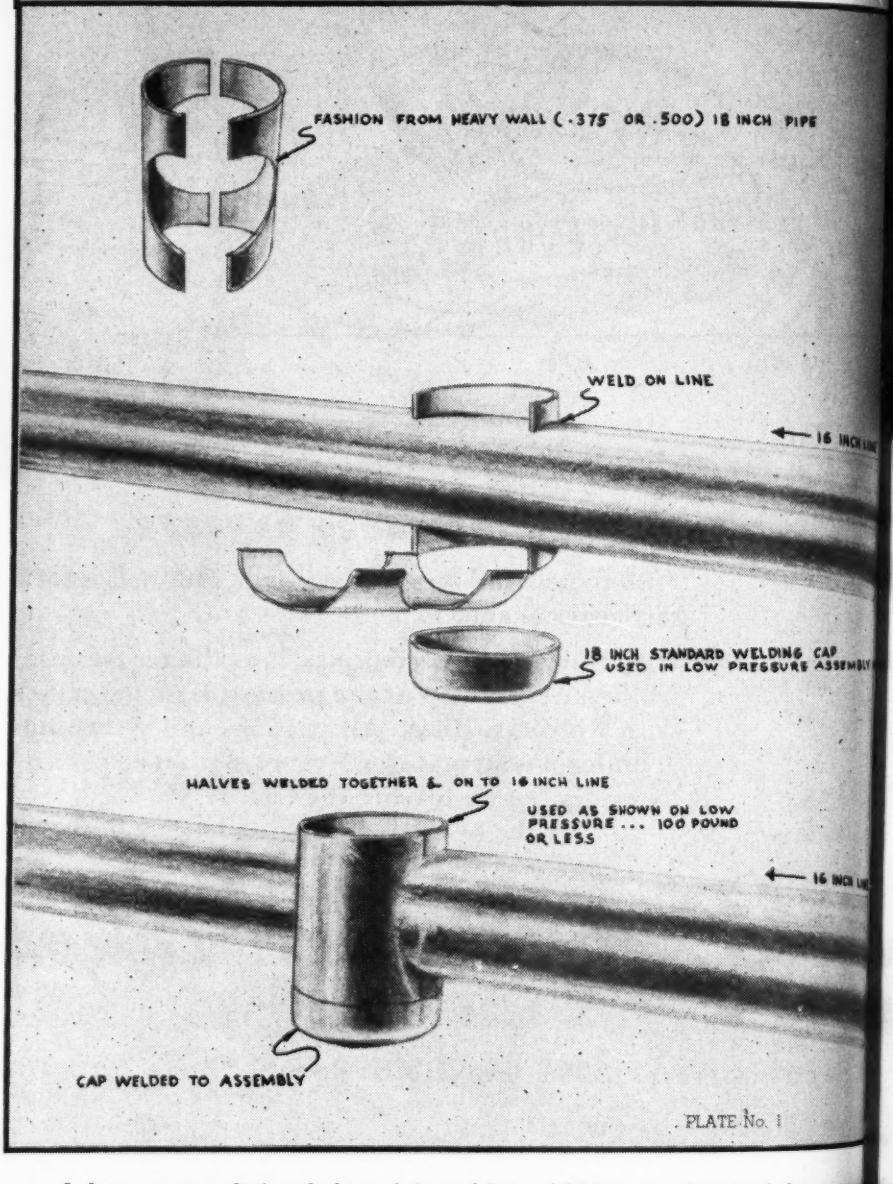
To prevent service interruptions when it was necessary to re-locate its main line through the city, El Paso Natural devised its own tapping machine with shutoff plug.

THE 16-in. tapping machine which our company has developed is nothing more than the result of a few simple ideas put together through necessity. Its chief distinguishing features are its size and its stopper.

The major part of the mechanism is copied from various shop-made tapping machines we have used for some time. Perhaps we have included some of the workings of machines that are on the market, and of course the machine can, and will be, improved upon. There are any number of tapping machines on the market for making large taps, but the feature of our 16-in. tapping machine is the shutoff plug, or stopper.

We have a 16-in. main line through the city of El Paso which delivers about 75% of the gas used in the city, with approximately 100 psi on the line. This line was installed a number of years ago and is almost devoid of main line gates. State highway expansion made it necessary to move this line in a few places, and of course we could not take the entire line out of service.

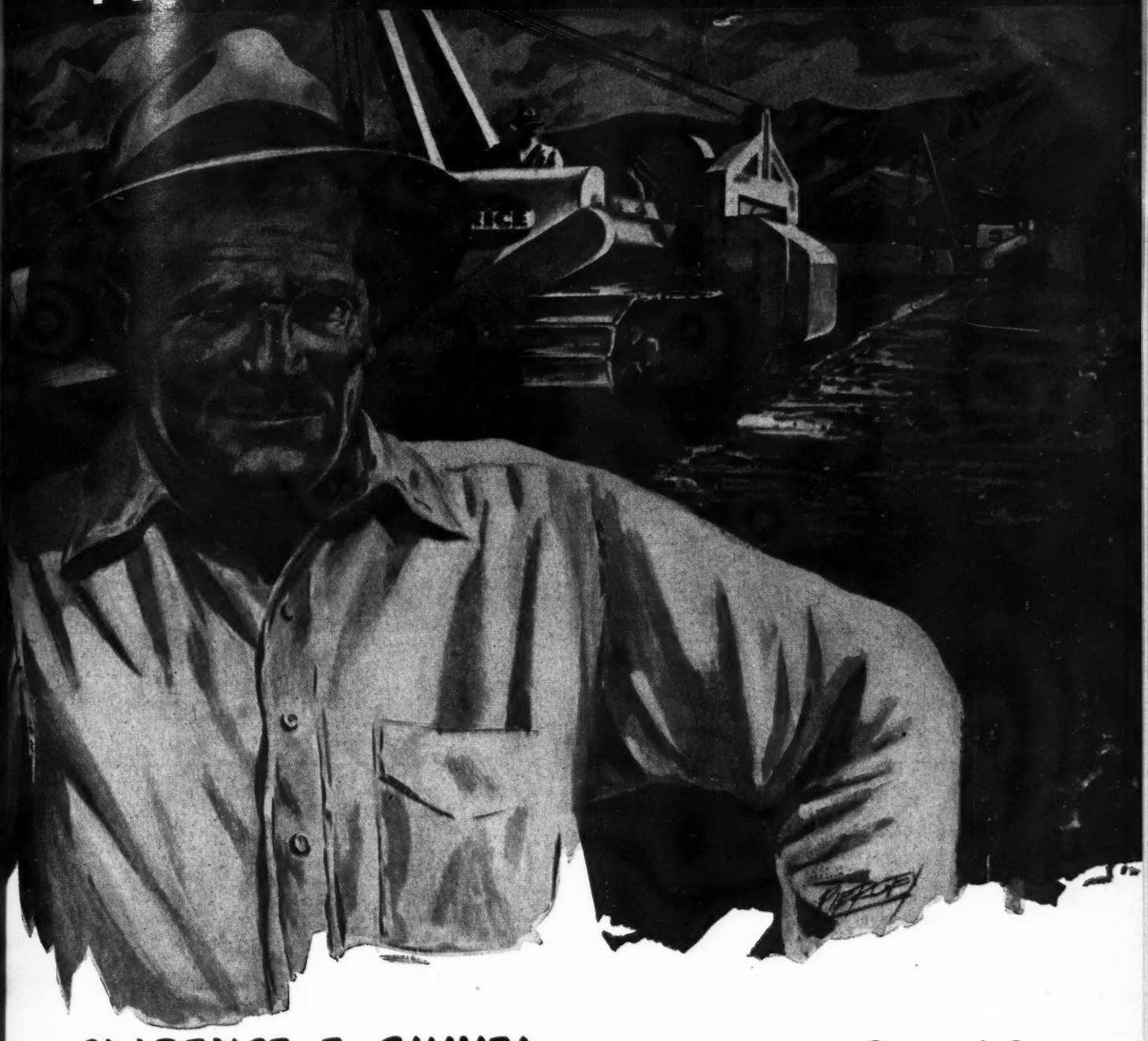
We contacted various tapping machine manufacturers, and found that none of them makes a tapping machine with a shutoff plug larger than 12 in. So, with the cooperation of various members of our company, we arrived at the arrangements shown in the following pictures.


FASHION FROM HEAVY WALL (.375 OR .500) 18 INCH PIPE
WELD ON LINE
16 INCH LINE
18 INCH STANDARD WELDING CAP USED IN LOW PRESSURE ASSEMBLY
HALVES WELDED TOGETHER & ON TO 16 INCH LINE
USED AS SHOWN ON LOW PRESSURE ... 100 POUND OR LESS
16 INCH LINE
CAP WELDED TO ASSEMBLY
PLATE No. 1

1. Low-pressure fitting fashioned from 18-in. (.375) pipe. Reduced from 18-in. OD to 17¼-in. OD to be used on high-pressure or as liner for high-pressure fitting described in following illustrations.

Presented at the PCGA transmission conference, April 2-3.

PRICE PIPELINE PORTRAITS



CLARENCE E. SHIVEL *Superintendent, Spread 3*

The success of H. C. Price Co. as "America's Foremost Pipeline Constructors" can be measured largely in terms of men like Clarence E. Shivel. For behind the army of machines that toil ceaselessly to stretch new steel arteries across the nation stands the human element — that "priceless ingredient" of skill, experience and dependability that is the mark of HCPCO personnel. Before rising to the position of superintendent, Shivel had served as a pipe gang foreman and prior to that he had taken a turn on nearly every spread job. This veteran of 24 years in pipelining is today responsible for directing one of the complex, hard-driving teams of men and equipment that are building for a better Tomorrow.

PIPELINE **PRICE** CONSTRUCTORS

H. C. PRICE CO.

PHILADELPHIA • BARTLESVILLE • NEW ORLEANS

America's Foremost Pipeline Constructors

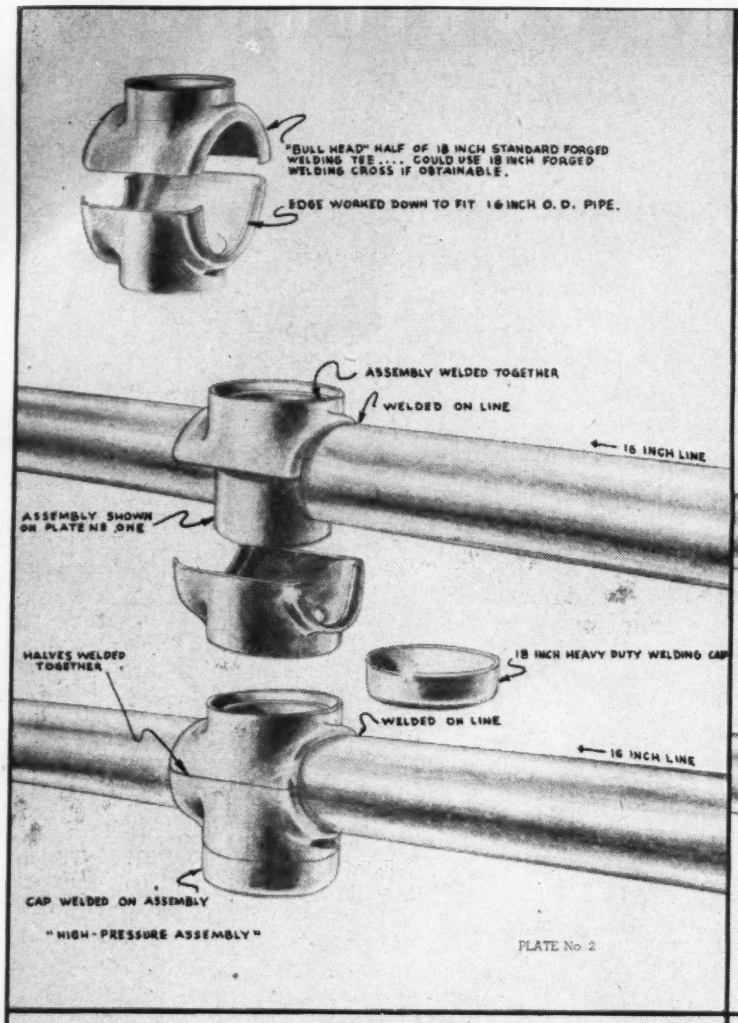

"BULL HEAD" HALF OF 18 INCH STANDARD FORGED WELDING TEE.... COULD USE 18 INCH FORGED WELDING CROSS IF OBTAINABLE.
EDGE WORKED DOWN TO FIT 16 INCH O. D. PIPE.
ASSEMBLY WELDED TOGETHER
WELDED ON LINE
16 INCH LINE
ASSEMBLY SHOWN ON PLATE NO ONE
HALVES WELDED TOGETHER
18 INCH HEAVY DUTY WELDING CAP
WELDED ON LINE
16 INCH LINE
CAP WELDED ON ASSEMBLY
"HIGH-PRESSURE ASSEMBLY"

PLATE No 2

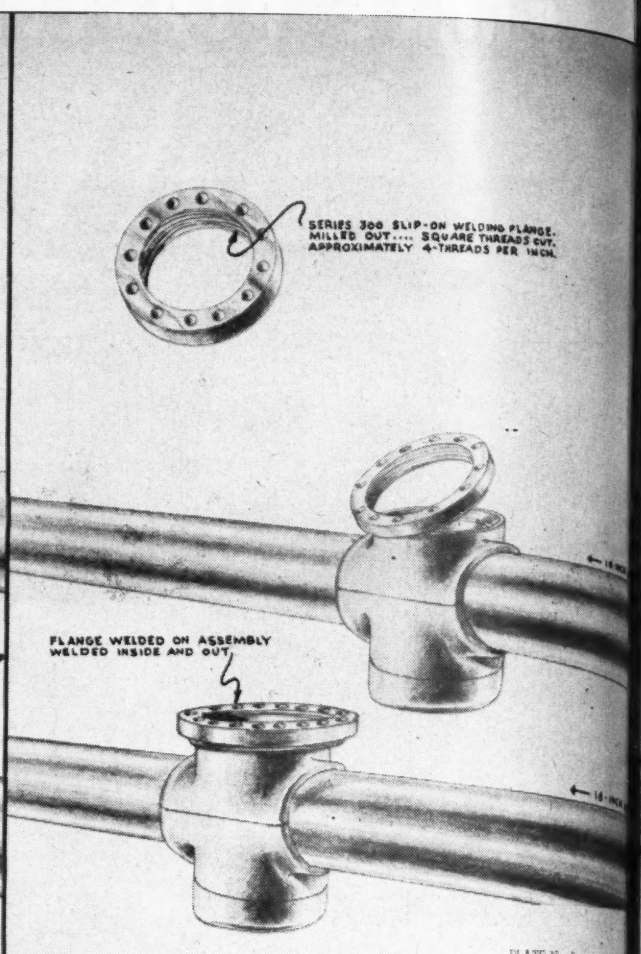

SERIES 300 SLIP-ON WELDING FLANGE. MILLED OUT.... SQUARE THREADS CUT. APPROXIMATELY 4-THREADS PER INCH.
FLANGE WELDED ON ASSEMBLY WELDED INSIDE AND OUT.

PLATE No 3

2. Assembly shown in No. 1 is to be welded to line before high-pressure assembly is added.

3. Series 300 slip-on flange face bossed; valve faces recessed to insure accurate line-up.

4. 300 series flange face bossed; valve faces recessed to insure accurate line-up.

5. Side brackets on cutter assembly are for cable sling.

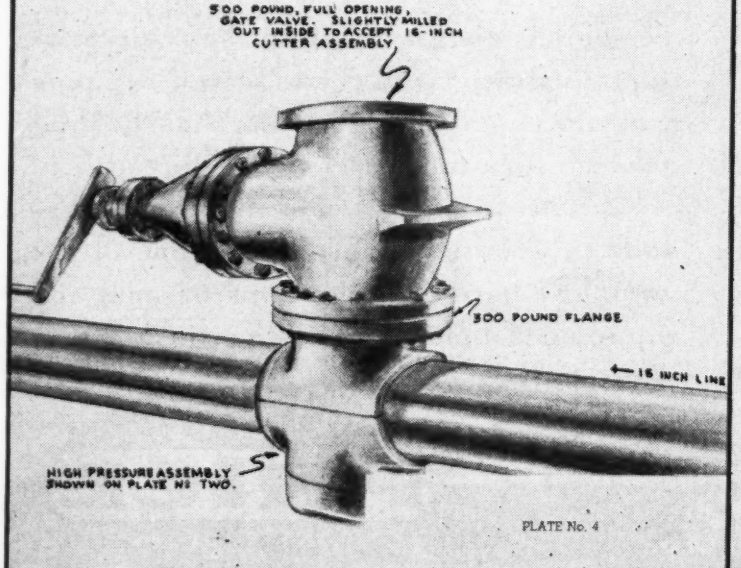

500 POUND, FULL OPENING, GATE VALVE. SLIGHTLY MILLED OUT INSIDE TO ACCEPT 16-INCH CUTTER ASSEMBLY.
300 POUND FLANGE
16 INCH LINE
HIGH PRESSURE ASSEMBLY SHOWN ON PLATE NO TWO.

PLATE No. 4

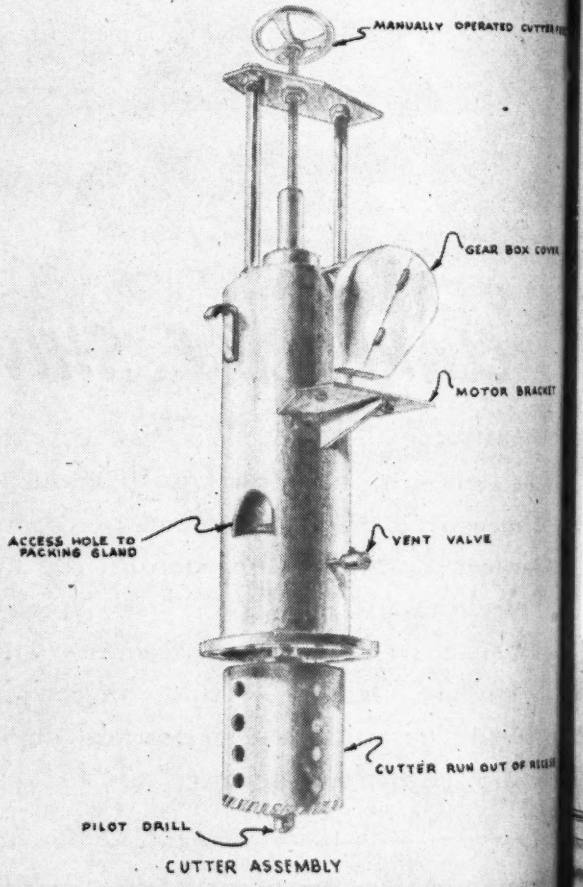
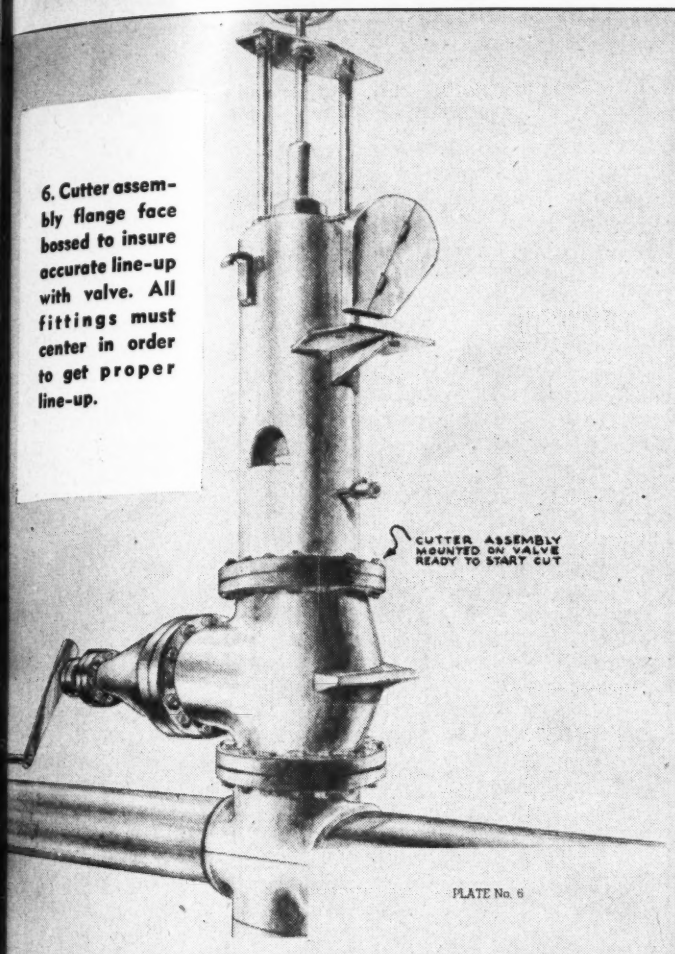
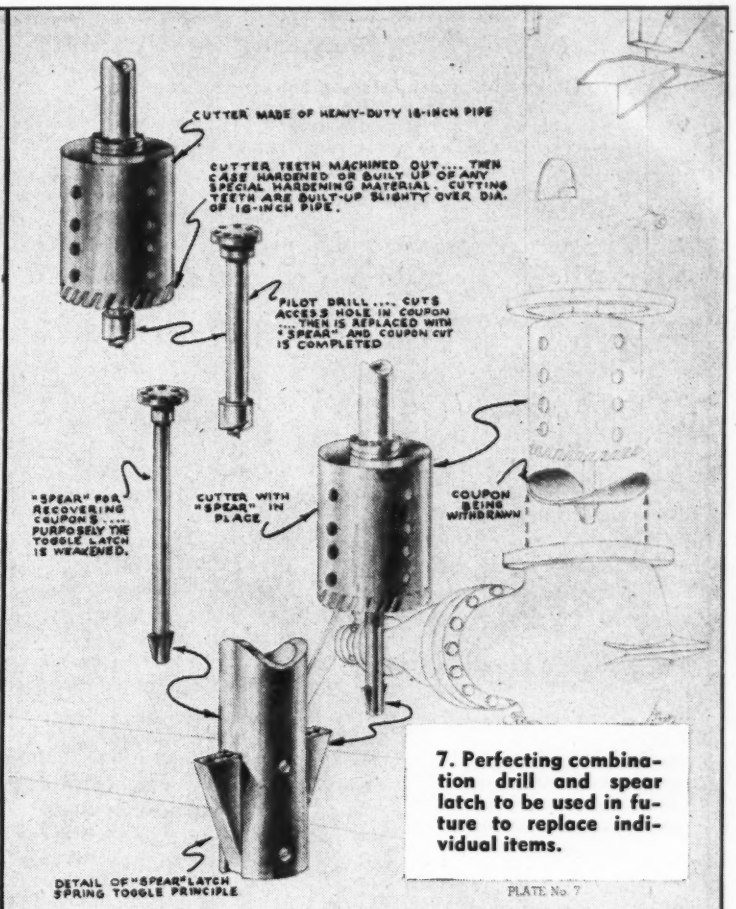


PLATE No. 5



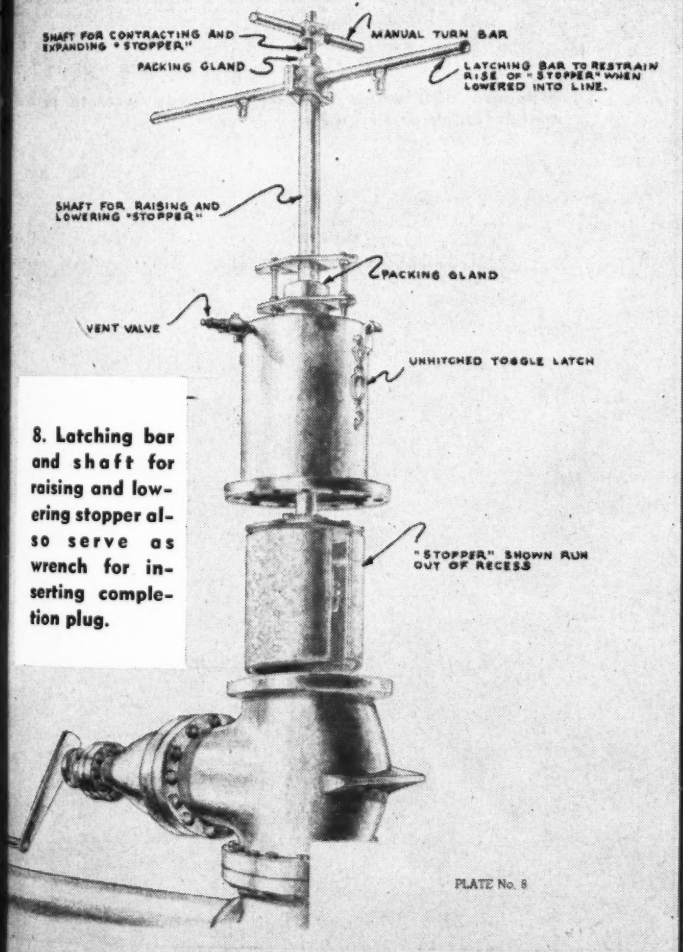
6. Cutter assembly flange faced bossed to insure accurate line-up with valve. All fittings must center in order to get proper line-up.

PLATE No. 6


CUTTER MADE OF HEAVY-DUTY 18-INCH PIPE
CUTTER TEETH MACHINED OUT.... THEN CASE HARDENED OR BUILT UP OF ANY SPECIAL HARDENING MATERIAL. CUTTING TEETH ARE BUILT-UP SLIGHTY OVER DIA. OF 18-INCH PIPE.
PILOT DRILL.... CUTS ACCESS HOLE IN COUPON ....THEN IS REPLACED WITH "SPEAR" AND COUPON CUT IS COMPLETED
"SPEAR" FOR RECOVERING COUPONS.... PURPOSELY THE TOGGLE LATCH IS WEAKENED.
CUTTER WITH "SPEAR" IN PLACE
COUPON BEING WITHDRAWN
DETAIL OF "SPEAR" LATCH SPRING TOGGLE PRINCIPLE

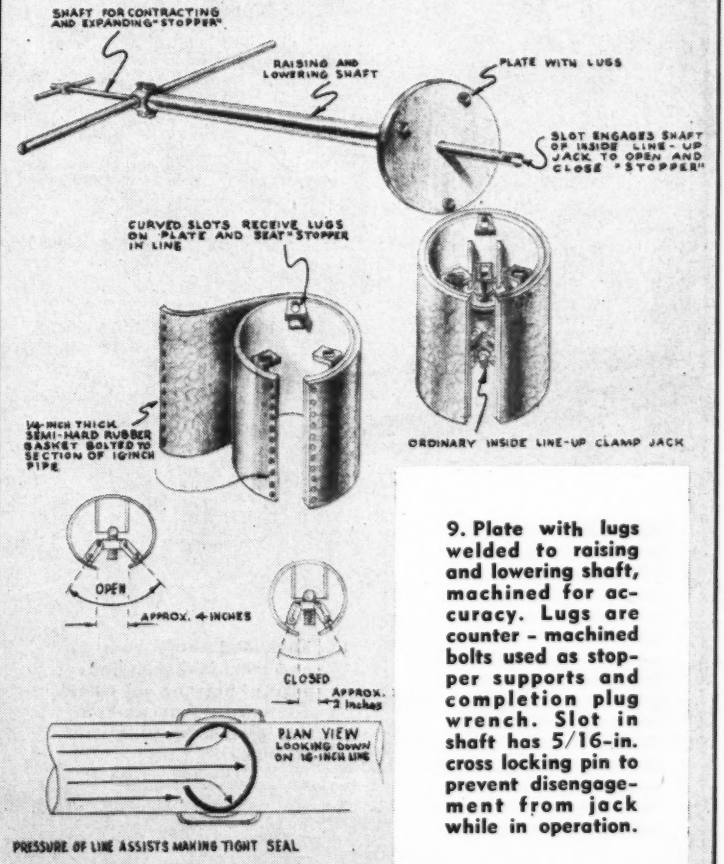
7. Perfecting combination drill and spear latch to be used in future to replace individual items.

PLATE No. 7


SHAFT FOR CONTRACTING AND EXPANDING "STOPPER"
MANUAL TURN BAR
PACKING GLAND
LATCHING BAR TO RESTRAIN RISE OF "STOPPER" WHEN LOWERED INTO LINE.
SHAFT FOR RAISING AND LOWERING "STOPPER"
PACKING GLAND
VENT VALVE
UNHITCHED TOGGLE LATCH
"STOPPER" SHOWN RUN OUT OF RECESS

8. Latching bar and shaft for raising and lowering stopper also serve as wrench for inserting completion plug.

PLATE No. 8


SHAFT FOR CONTRACTING AND EXPANDING "STOPPER".
RAISING AND LOWERING SHAFT
PLATE WITH LUGS
SLOT ENGAGES SHAFT OF INSIDE LINE-UP JACK TO OPEN AND CLOSE "STOPPER"
CURVED SLOTS RECEIVE LUGS ON PLATE AND SEAT "STOPPER IN LINE
ORDINARY INSIDE LINE-UP CLAMP JACK
½-INCH THICK SEMI-HARD RUBBER GASKET BOLTED TO SECTION OF 18INCH PIPE
OPEN
APPROX. 4 INCHES
CLOSED
APPROX. 2 Inches
PLAN VIEW LOOKING DOWN ON 18-INCH LINE
PRESSURE OF LINE ASSISTS MAKING TIGHT SEAL

9. Plate with lugs welded to raising and lowering shaft, machined for accuracy. Lugs are counter-machined bolts used as stopper supports and completion plug wrench. Slot in shaft has 5/16-in. cross locking pin to prevent disengagement from jack while in operation.

PLATE No. 9

10. Plate beneath latching bar serves as guide for accurate seating of stopper.

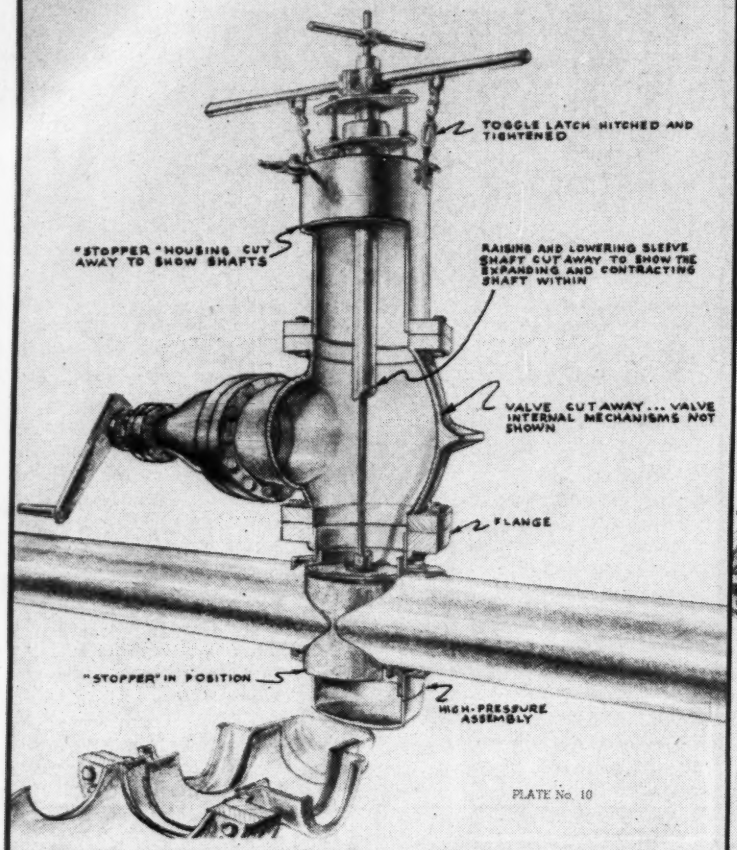

TOGGLE LATCH HITCHED AND TIGHTENED
"STOPPER" HOUSING CUT AWAY TO SHOW SHAFTS
RAISING AND LOWERING SLEEVE SHAFT CUTAWAY TO SHOW THE EXPANDING AND CONTRACTING SHAFT WITHIN
VALVE CUTAWAY... VALVE INTERNAL MECHANISMS NOT SHOWN
FLANGE
"STOPPER" IN POSITION
HIGH-PRESSURE ASSEMBLY

PLATE No. 10

11. Gas has been shut off and main line valve installed, or whatever job is required.

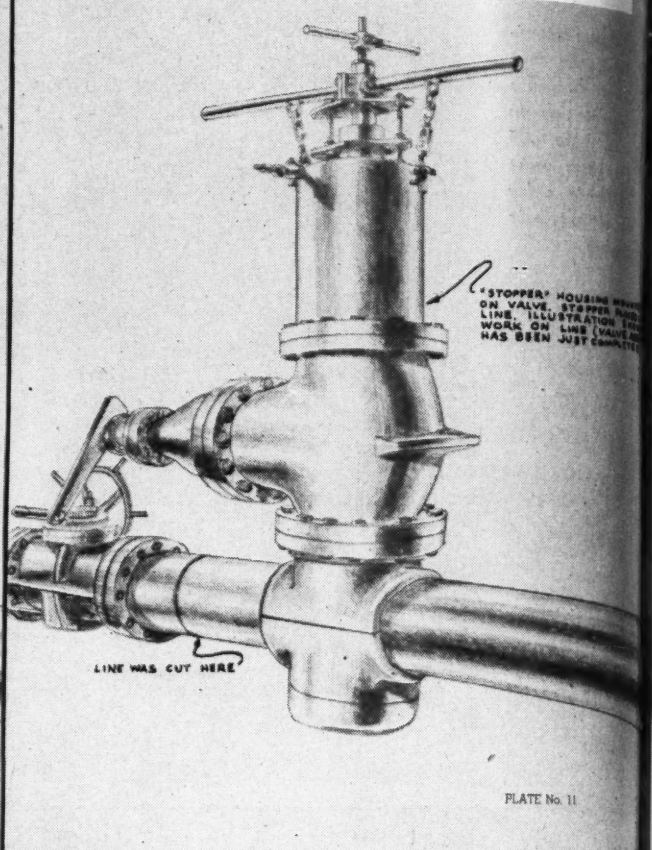
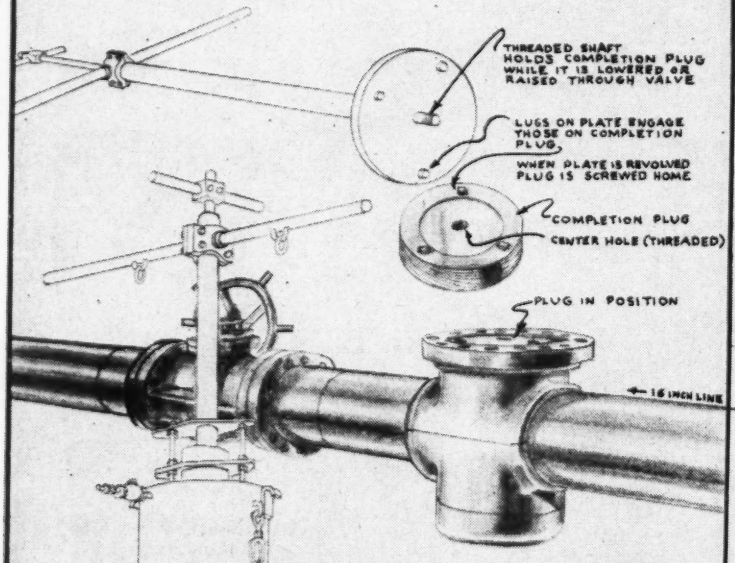


PLATE No. 11


THREADED SHAFT HOLDS COMPLETION PLUG WHILE IT IS LOWERED OR RAISED THROUGH VALVE
LUGS ON PLATE ENGAGE THOSE ON COMPLETION PLUG
WHEN PLATE IS REVOLVED PLUG IS SCREWED HOME
COMPLETION PLUG
CENTER HOLE (THREADED)
PLUG IN POSITION
16 INCH LINE
COMPLETION PLUG RUN OUT OF RECESS. VALVE NOT SHOWN ON DRAWING.

12. Threaded shaft built up and machined oversize to prevent blowing out when disengaged from completion plug after plug is in position.

PLATE No. 12

13. Standard 300 series completion flange recessed to match flange on fitting.

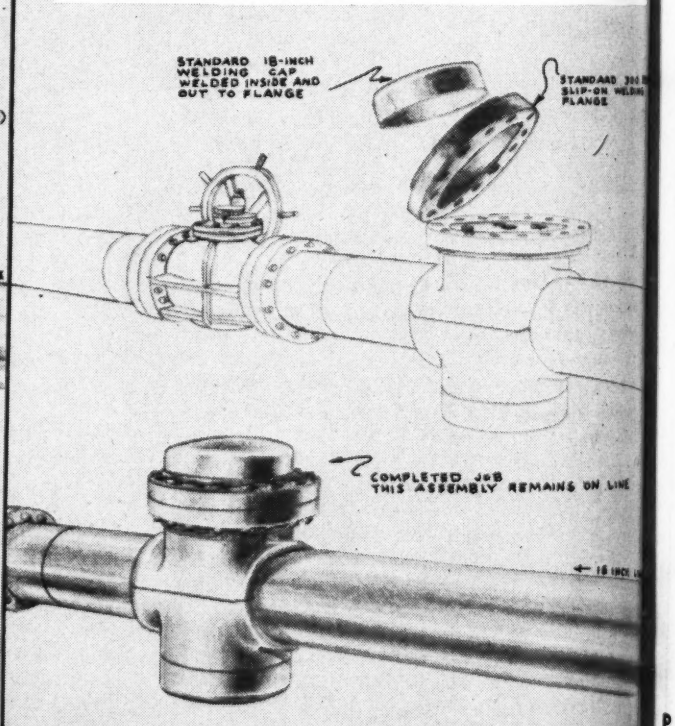
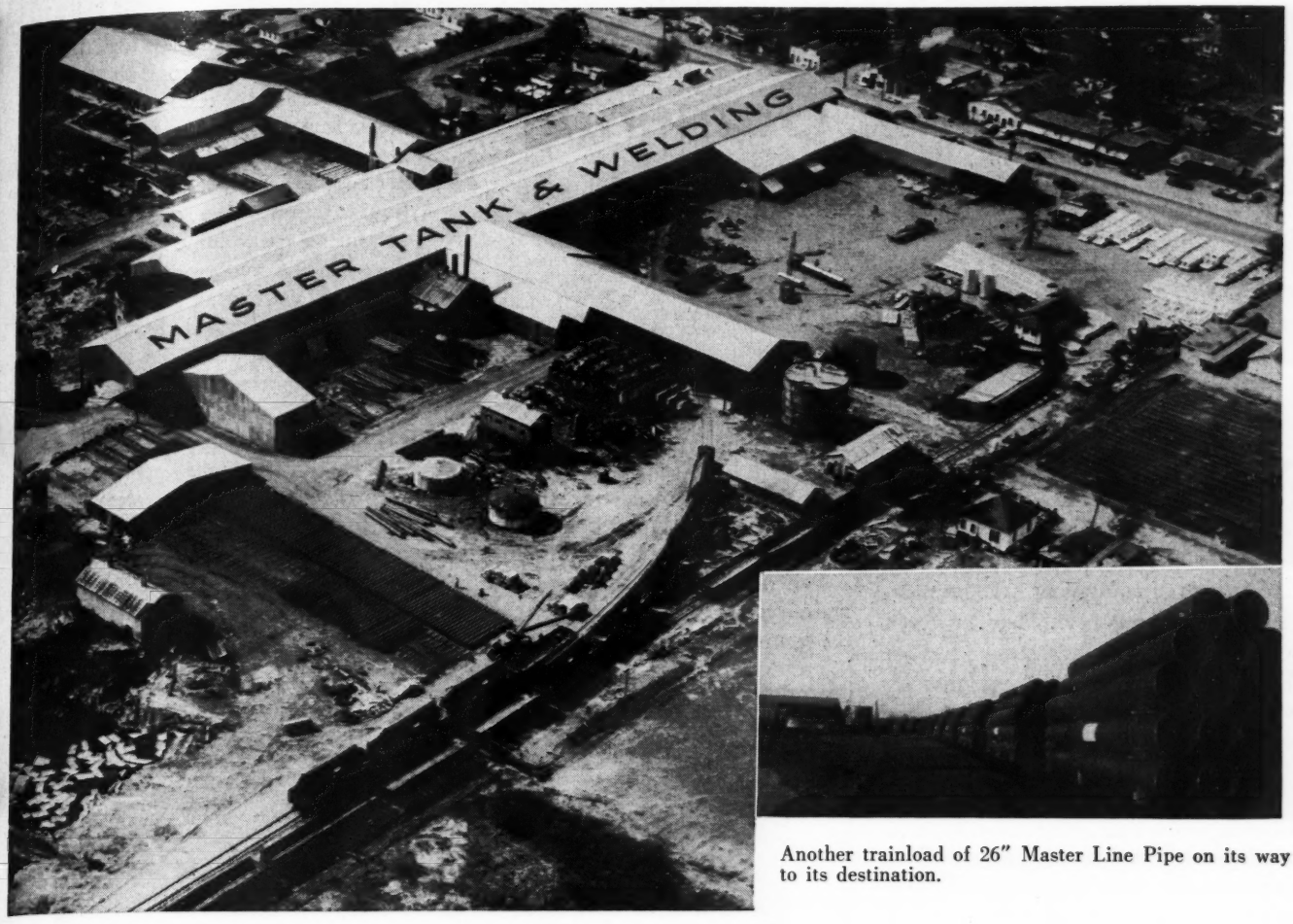


PLATE No. 13



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Problems in Gathering High Pressure Gas

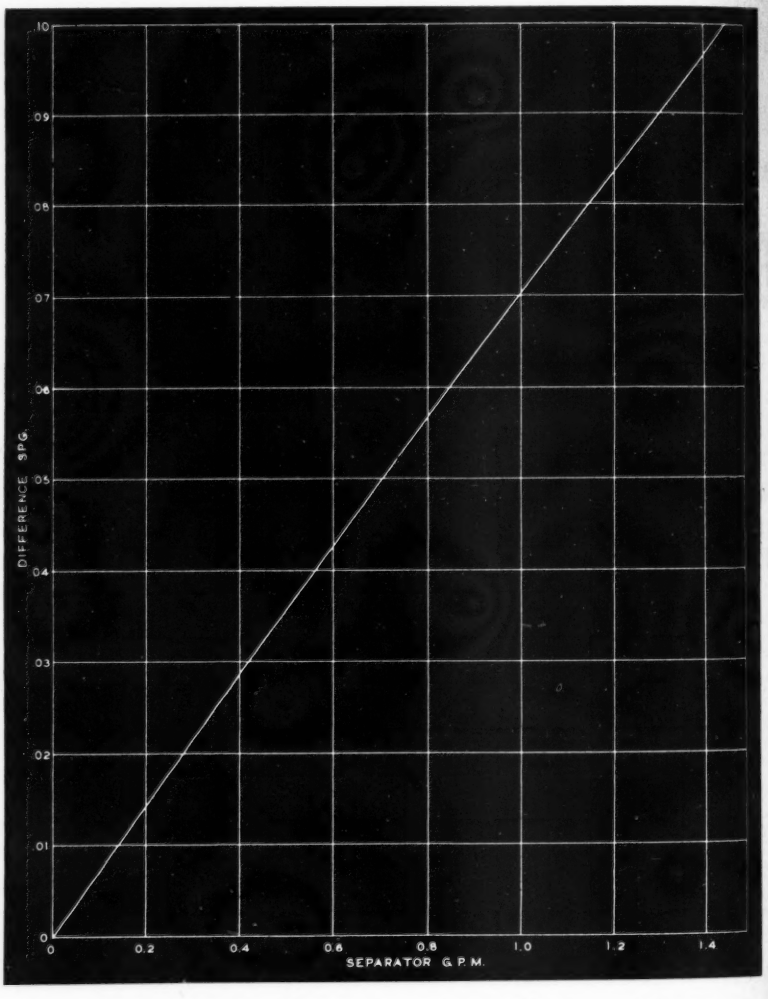
By ROY A. SCHUSTER
The Chicago Corp.
Corpus Christi, Texas

MANY problems are encountered in the design and operation of a high-pressure gas gathering system, and a number of installation methods and different types of equipment have been devised to overcome them. Here, however, we are concerned with what we feel are the most troublesome and the ones for which means of combatting them have recently been improved.

One of the first problems in laying out a field gathering system is the sizing and location of the lines. The actual location of the lines, of course, depends on the location of the wells with respect to the plant and the type of terrain to be crossed. It is often advisable to lay several main field lines radiating outward from the plant, and connect the individual wells to the main lines with laterals. In other cases, the field has been looped with one large main line which originated and terminated at the plant, with the wells being connected to the main line with laterals. One of the main considerations in laying out a field system is to accomplish a good job with a minimum of investment. The determination of the minimum cost can be approached by designing several systems, and choosing the one with the lowest cost which is adequate for the job.

The method of determination of the size of the pipe is open to considerable discussion. None of the several pipeline flow formulas will accurately apply to a gathering line containing both gas and liquid. Accumulation of liquids in the lower places in the line requires an increase in pressure to move the liquid over into the next low place, resulting in the actual pressure drop being larger than that calculated. It has been our experience that with main lines, approximately 6 in. in diameter in short lengths of two or three miles and with the gas containing about 1 gpm, the pressure drop can only be approximated by using one of the standard pipeline flow formulas and multiplying by 150%.

When a well is connected into the main system, some method of testing the gpm of the gas must usually be provided for at the well. Several methods may be used to make these tests. In some instances a field separator is set on the line at the well and the tests run on this separator. In some cases the separator is calibrated and the test, which can be run periodically, is made by shutting in the liquid dump valve on the separator, measuring the volume of distillate produced in the separator over a period of time, and calculating the yield from the volume of gas passed through the separator. In other cases the liquid can be measured continuously by the use of meters. By taking a slight pressure drop across the separator, the liquid can be forced continually through the meter and into the gas line downstream from the control equipment. The cost of installing a separator on a well is considerable, and depending upon the number of wells in the field, a very large amount of money can be invested in the installation of a

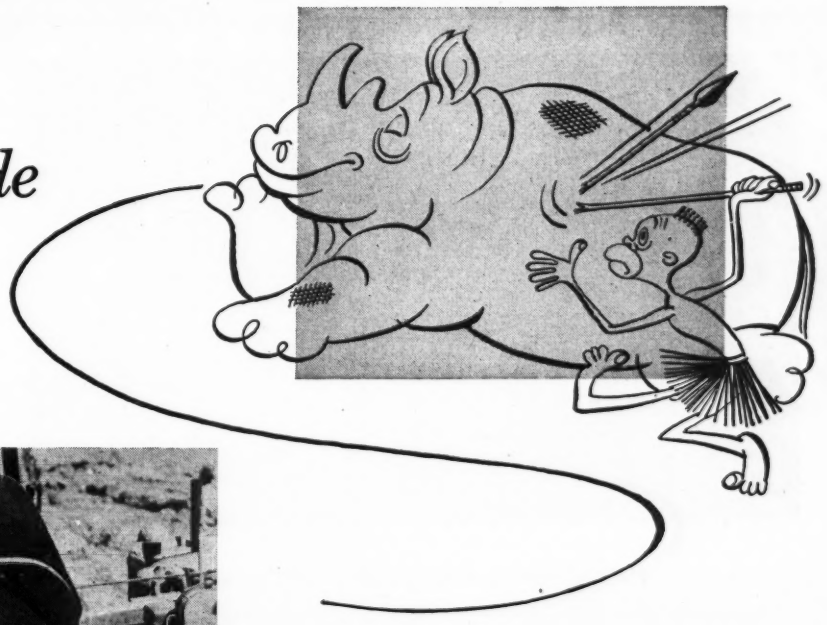


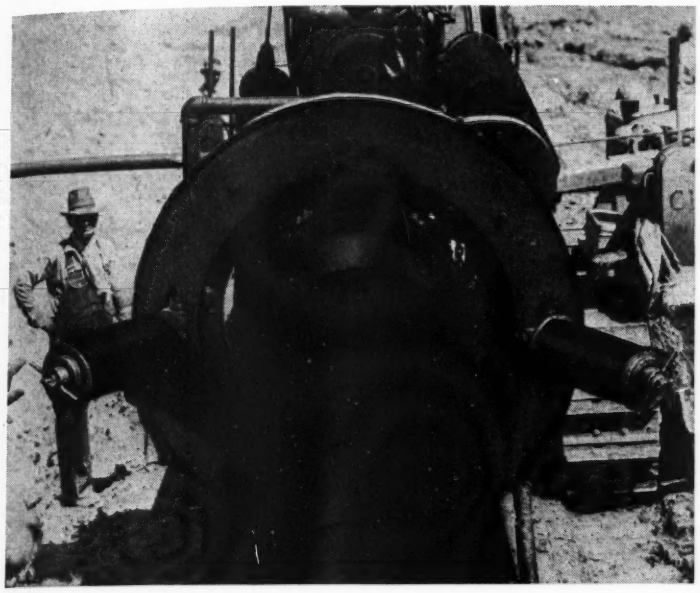
Calculating Wet Gas Specific Gravity

To obtain wet gas gravity (Fig. 1), actual gpm as tested on well is located on curve to find proper difference between wet and dry gas gravity. Difference is then added to actual dry gas gravity as tested.

This paper was presented at the NGAA convention in Houston on May 1.

Like the Rhino's tough hide that protects what's inside...





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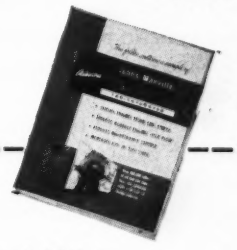

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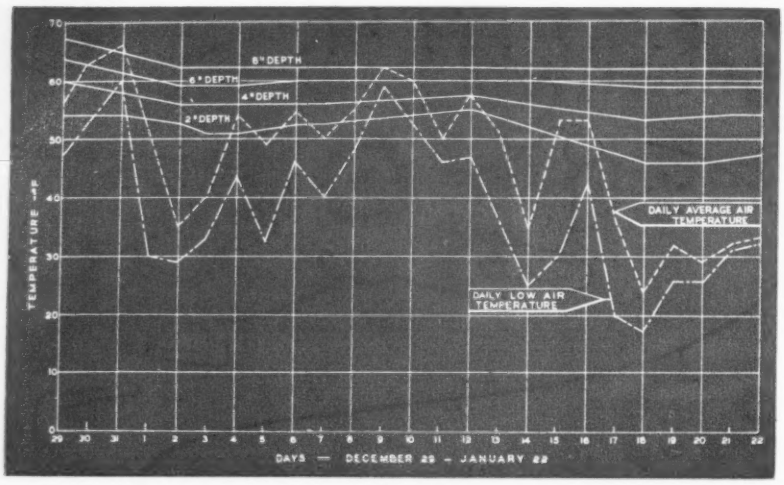

Preventing Hydrate Formation

Relationship of depth to ground temperature was discovered through tests, the results of which are plotted here (Fig. 2). At a depth of 6 ft, the temperature did not drop below 59°, which is on the borderline of hydrate formation.

large number of separators.

Due to the large investment required for the installation of separators, our company has relied upon the use of a gpm test wagon to make periodic tests of the yields on each individual well. In the actual installation of equipment to sample the stream at the well, the gas first passes through an orifice meter, then through a test loop buried in the ground, and finally through an adjustable choke. It is our belief that, with wellhead pressure maintained on the meter run, the liquid remains in the gas phase better, which results in better measurement. The test loops are usually fabricated from 2-in. pipe and are of the proper length to meet NGAA specification for proper sampling. It might be mentioned here that the installation of the proper equipment and the operation of such equipment for sampling is of utmost importance. Undoubtedly, more trouble has been experienced in the proper sampling of these two phase streams than has been encountered in the actual running of the tests.

The method of running the tests consists of passing the sample gas stream through a small calibrated separator and measuring the liquid which drops out in the separator. The gas which leaves the separator is likewise measured. A sample of the liquid in this high pressure small scale separator is flashed to atmosphere to obtain the flash factor. This factor, when applied against the yield as determined in the small high pressure separator, gives the actual yield which would have been encountered in stock tank conditions. A charcoal test is usually run on the residue gas from the separator. This may or may not be included in the test yield, depending upon the processing agreement. The specific gravity of the gas is also run on the residue gas.

Some time ago the results of this test, as compared to those obtained from full scale separators, were questioned. Accordingly, meters were installed in one of the plants to measure the total volume of condensate produced from the master separator in the plant yard through which all of the gas was processed. In actual plant operation, the distillate was never flashed to atmosphere, but was processed through stills at a higher pressure. The meters were actually installed on the outlet of a 500-lb condensate vent tank. Then a series of flash factors was obtained by actually running tests to determine the loss which would occurr if this 500-lb distillate were flashed to atmosphere. During a period of two years, some 1500 flash tests were run. The average of this flash factor, when applied against the volume of distillate measured through these large meters, gives the volume in barrels produced for the month from all of the wells. A comparison of the results obtained from the meters with the test wagon method shows the difference to be only a very few per cent.

The specific gravity determined by the test wagon is run on the residue gas from the separator, whereas the specific gravity of the wet gas at the meter is required for accurate calculation of the gas volumes. Knowing the specific gravity of the dry gas, the specific gravity and molecular weight of the distillate, and the recovery of distillate in gpm, the tester can calculate the specific gravity of wet gas. This calculation, however, is quite cumbersome and would require considerable time if applied to the specific gravity used to calculate gas volumes on each well. It was thought very desirable if a table or curve could be prepared which would quickly convert the above data from the dry to wet gas specific gravity.

We prepared a curve for this purpose which has proved very practical and sufficiently accurate. (See *Fig. 1*) Various points on this curve were determined by assuming a dry gas gravity which was the average of the gravity in this particular field. From this dry gas gravity, the wet gas gravity was calculated for different gpm's. By subtracting the dry gas gravity from the corresponding calculated wet gas gravity, a "difference" is obtained. The curve was prepared by plotting these differences against the gpm's.

To use the curve, the actual gpm as tested on the well is located on the curve to find the proper difference. This difference is then added to the actual dry gas gravity as tested to obtain the wet gas gravity. The accuracy of this curve has been checked for different dry gas gravities and molecular weights and gravities of the distillate, and it is found that over the normal range of operation, the maximum error is .0005. For practical purposes, this error can be disregarded. The use of this curve has been of considerable help to the meter department in the calculation of the gas volumes.

Expansion Problem

In connecting wells to the field lateral lines, it has been our practice to set the lines in concrete just as they enter the ground downstream from the choke. On one occasion, this line ran straight from the well approximately 4000 ft to the main line. When this well was turned on, the expansion of the line, due to the high temperature of the gas, broke the concrete block and almost bent the test loop together. Had this field line been connected directly to the well without the test loops, the well connections would have undoubtedly been broken. It is now our practice to come off of the wellhead connections at approximately 90° to the field lines, which permits the bend of the pipe in the ground to take up most of the expansion.

The location of expansion loops for gathering lines has been open to con-

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siderable discussion. On several occasions an attempt was made to calculate the expansion and properly locate these bends. When the lines were installed and placed in operation, instead of the loops taking the expansion, the lines came out of the ground in some other location. Apparently the compactness of the soil, slight bends in the pipe, etc., had more to do with the control of the point at which expansion was relieved than the actual location of the loops. In recent installations, we have not installed any loops at all. Care must be taken, however, that the lines are very securely anchored at critical locations such as the wellhead, headers, etc., to prevent this equipment being damaged. Then when the line is placed in operation we watch it very closely, and if the line comes out of the ground at any place, we install the expansion loop at that location.

Corrosion

We have been very fortunate in operating almost entirely in sweet gas fields, and, consequently, have had very little experience with corrosion. In a few wells, however, some corrosion has been experienced, due principally to CO_2 or some of the organic acids. Considerable experimenting was done with various compounds, and, finally, one of the common corrosion inhibitors on the market was found to reduce the trouble. The inhibitor is admitted to the well at certain intervals, depending upon the gas volume produced and the amount of corrosion incurred. If the liquid type inhibitor is used, it is either injected with a lubricator or a small pump. Corrosion has been greatly reduced, and, consequently, this method of solving our particular corrosion problem has been very satisfactory.

In our main lines, very little internal corrosion has been noticed. All of the field lines are protected externally with cathodic protection. Depending upon the location of the field lines with respect to the plant, the rectifiers or generators are installed either in the plant, in the field, or in both. The wells are electrically insulated from the lateral lines to prevent drainage of the current. A complete check is usually made of the plants and the fields at least once a year to determine whether the proper protection is being maintained throughout the system. Usually, only minor adjustments are required in the units or in the ground beds. Occasionally a new unit is found to be required after making some major changes in the field or plant piping.

Hydrates

Normally when starting up a new field system, considerable trouble is experienced due to hydrate formation which plugs off the lines. In the areas in which our company operates, the hydrate formation at pressures around 1200 or 1400 psi has been found to occur at approximately 58° or 60°. These hydrates can be removed by bleeding the lines down to atmosphere and blowing out the liquid. After a few days of operation, and when the field lines are only a few miles in length, sufficient heat is usually carried in with the gas from the wells to keep the temperature above hydrate formation. In longer lines where the temperature drops below the hydrate point before the gas enters the plant, it is usually found advisable to install heaters on the line.

It has been noted that hydrate trouble is experienced more often in cold weather, indicating that the atmospheric temperature has a considerable effect upon the temperature in field lines which are buried at a depth of 2 to 3 ft. The question arose as to temperature of the ground at a greater depth, the thought being that there it might not drop below the hydrate point. Consequently, a test was run, taking temperatures at 2-ft intervals from a 2-ft depth to an 8-ft depth. During a cold spell while the test was being run, it was found that the temperature at a 2-ft depth reached a low of 46°, which is below the hydrate point; at a depth of 6 ft, the temperature did not fall below 59°, which is on the border line of hydrate formation. (See *Fig. 2*)

It is our belief that in long lines, say approximately 10 miles in length, the trouble due to hydrates could be greatly reduced if the line were laid at a depth of 6 ft or more; this would be limited to a location where winter temperatures are similar to that encountered in east Texas. It is estimated that the additional cost of laying three miles of pipe at the greater depth would be equal to the initial investment for a heater. All the cost of fuel and operating expense would be eliminated. Although we have not had occasion to install a great amount of pipe since these tests were run, we do plan to install some pipe in the future at the greater depth, when the occasion arises, because we feel that this installation has considerable merit.

As the pressure declines in a field, the point will eventually be reached where compression will be required. If only one or two reservoirs are involved, and the pressure decline is uniform throughout the field, one compressor station could be centrally located, normally at the existing gasoline plant, and the entire field placed on compression at one time. Usually, however, the pressure will decline more rapidly in one section of the field than in the other section, and it is necessary to compress the gas from a few wells before compression of the entire field is required. Considering the location and number of weak wells, it may be expedient to install one of the small so-called portable compressors to compress the gas from one or two wells. We have found this to be desirable in several cases. By installing two or three units, the installation of the centrol compressor station, with large initial costs, carrying charges, and operation, has been postponed several years.

Removal of Liquids

When wet gas is compressed, the liquids must be removed from the inlet to the compressors before compression of the gas to prevent damage to the unit. After compression to a higher pressure, the liquid must be returned to the discharge of the portable compressor so that it may be processed by the gasoline plant. This liquid can either be returned to the discharge line by the use of some type of pump or by the use of a blow case. Most of our portable units are situated in some isolated location, and the field operator makes the rounds of two or three units once a day. It was believed that trouble might be experienced in the continuous operation of liquid pumps with no operator in attendance, and it was decided that a blow case would be more satisfactory. Since the blow case would be operated with regulators and liquid level controls only, it was believed that less mechanical trouble would be experienced when operating with no one in attendance.

The actual installation consists of passing the gas from the well through a regular field separator, through an orifice plate or other restriction to obtain a slight pressure drop, and then to the compressor. (See *Fig. 3.*) The gas from

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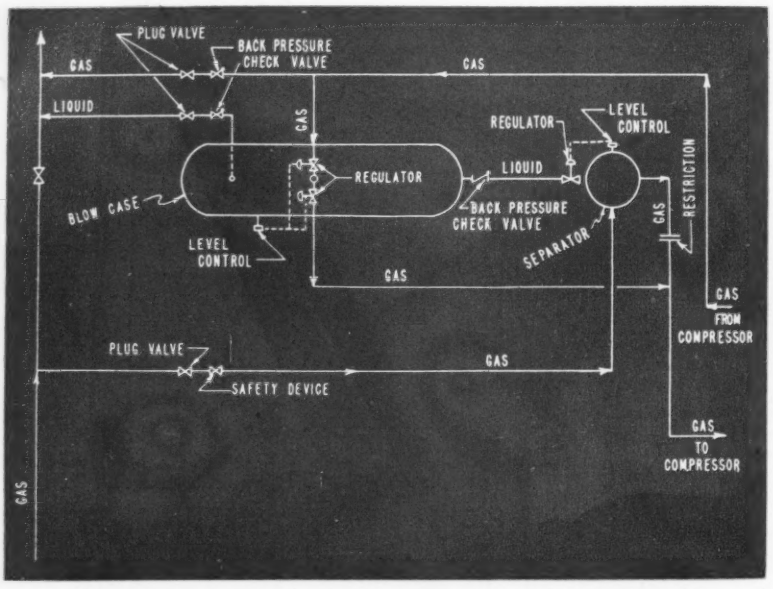

Removing Liquids at Compressor Inlet

To prevent damage to compressors, liquids are removed as shown in the blow case flow diagram (Fig. 3), and then returned to the discharge line by the use of the blow case.

the compressor is pumped in the main line at the required higher pressure. The compressor unit is protected with high level, temperature, and pressure automatic safety shutdown controllers.

In normal operation, the blow case floats on the suction line at the same pressure as the suction to the compressor downstream from the restriction point. When liquids have accumulated in the separator to the control point, the control opens to permit the liquid to be pressured into the blow case. When the liquids in the blow case rise to the control point, the regulator connecting the suction line of the compressor to the blow case closes, and the regulator connected to the discharge line opens, which pressures the blow case to discharge pressure, permitting the liquid to flow into the discharge line of the compressor. When the liquid drops to the control point, the regulators operate in the reverse fashion. A check valve is located between the separator and the blow case to prevent a back flow of liquid if the control on the separator should open at the same time the blow case was being pressured. We have had several of these units in operation for two or three years and very little trouble has arisen.

As the pressure declines on more wells, the point is reached where considerable horsepower is required to compress the gas. Then consideration should be given to the installation of one large central compressor station. A study has recently been made for a particular case, comparing the cost of one large station to that of small compressors at each well. If one large central compressor station were installed, it would be necessary to loop the existing field lines in order to produce the same volume of gas at a lower pressure, due to the pressure drop increasing with the lower operating pressure; on the other hand, if small compressors were installed on each well, each compressor would discharge into the existing lines at the present high pressure and the looping of the field lines would be eliminated.

In actual practice, it is impossible to purchase a unit of the exact horsepower required for the particular volumes of gas and pressures to be encountered. Engines of the next larger size must be installed. As an example, to fulfill 215-hp requirements, it might be necessary to install a 250-hp unit. A considerable loss of horsepower results when 30 or 40 units are required. Also, the cost per horsepower hour for the small units is higher than the large compressors.

In the case recently studied, the cost of installing one large central compressor station and looping the field lines amounted to approximately $1.5 million, whereas the cost of installing a compressor on each well amounted to almost $2 million. The small units require more operating labor, maintenance, and other expenses than one centrally located plant. It was estimated that the direct operating cost of the individual units would be almost twice that of one large central plant.

No hard and fast rule can be established to govern the economics of every situation. Every field, owing to difference in topography, well spacing, accessibility, climatic conditions, etc., will present a separate problem.

When any field system is installed, safety should be one of the prime considerations. If the plant and field lines are designed to operate at 1800 psi and the shut-in pressure at the wellhead is 2500 psi, it is probably more economical to design the entire system for a 2500-psi operating pressure. In case of an emergency shutdown to the plant, or in case of any line stoppage due to hydrate formation, all sections of the line would withstand the full well pressure.

However, another problem presents itself in operating a low pressure line when the deliverability and shut-in pressure of certain wells which produce into the low pressure lines are greatly different. Take as an example a 500-psi gathering line; the shut-in pressure on part of the wells feeding into this system is low, which requires that the gas be compressed, but at the same time there may be one or two high pressure wells with low deliverability which must be produced into this low pressure system in order to meet their allowable. In case of an emergency shutdown at the plant or line stoppage, the high pressure well with the low deliverability could eventually pressure this line up to a very high pressure. From a cost standpoint, however, it would be uneconomical to install a line capable of withstanding 2500 psi when the normal operating pressure of the line would only be 500.

Among several safety devices which could be used in this case would be high pressure shutoff controls on each well. In case of line stoppage, these controls would be set to shut off each well when the pressure increased to the control point, then preventing gas from the high pressure wells from feeding into the line. This line could also be protected with relief valves or safety heads. Relief valves have not proved too satisfactory on the higher pressure lines due to the formation of hydrates when the valve is open, which prevents the valves from closing when the pressure drops below the set point. However, on the lower pressure lines, they will prove of considerable value.

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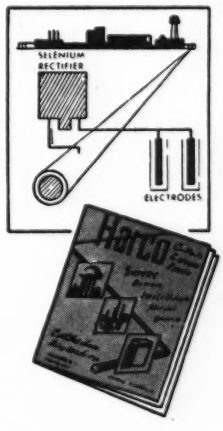

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PIPELINE NEWS

Canada Conditionally Approves Northwest Export But Westcoast Faces Battle as FPC Hearings Begin

Westcoast Transmission Co. last month won partial approval of the Canadian government's board of transport commissioners for its proposed line from Alberta's Peace river district to Vancouver and the Northwest United States, but at least three difficulties still barred the way.

First, the board said the company would have to prove up sufficient reserves to support the line.

Second, FPC must approve the proposal, and hearings only began June 16.

Third, Henry Gellert, president of Seattle Gas Co., refused to give a firm letter of intent requested by Westcoast, but instead issued one to Pacific Northwest Pipe Line Corp., Houston, which has proposed to build a line from the "Four Corners" area of Colorado, Utah, New Mexico, and Arizona to the Northwest.

Despite the difficulties, Westcoast's president, Frank MacMahon, was reportedly going ahead with plans to build the Canadian line. He hopes to start actual laying operations next spring, completing the line by 1954 or earlier. He expressed the belief that reserves could be surveyed in a few weeks with the help of federal mines department experts.

It appeared to observers in Ottawa, where the transport board hearings were held, that the Canadian government was eager to push the matter through to completion in hopes that FPC would reciprocate in pending applications to increase exports from the United States to Eastern Canada. Wholehearted cooperation with FPC staffers who might be assigned to an examination of Alberta's Peace river reserves was assured; furthermore, the board adjourned indefinitely the applications of Trans-Canada Pipeline Ltd. and Western Pipe Line Ltd. to pipe gas eastward from Alberta for Canada's own use. It seemed that Westcoast was definitely being given priority on gas export, even over the eastern provinces.

The board also narrowed the field in the race for an Alberta-to-Northwest line by dismissing the pleas of Westcoast's competitors, Alberta Natural, Prairie Transmission, and Champion Pipeline, all of which were planning to pipe gas from the Pincher creek area. However, Westcoast still had to face a number of competitors in the FPC hearings.

The refusal by Mr. Gellert to give Westcoast a letter of intent was duplicated by other Washington utilities serving Tacoma, Everett, Bellingham, Wenatchee, Yakima, and Walla Walla. Gas companies in the area are displeased with the tight lid placed upon the volume of export approved by the Alberta government. President Gellert, however, did leave the door open by stating that he would be interested in any "basically new developments" in the situation.

The company to which Mr. Gellert issued the letter, Pacific Northwest, recently altered its scheme for serving the area for a second time. Originally the company's head, Ray Fish of Houston, had proposed a line from Texas, but had altered this to tie in a line from Pincher creek and reciprocally export gas to eastern Canada through an extension of the present line which serves Southwest gas to Detroit. His latest plan, to bring the gas from the Four Corners, is reportedly based on firm commitments from producers for 2 trillion feet of gas.

Pacific Northwest plans to pipe 300 MMcf per day to the region.

Large-Scale Construction Planned By Tennessee Gas

What appears to be this summer's largest scale gas pipeline construction job—the laying of 525 miles of mainline loops, the addition of four new stations, and the enlargement of 16 others—is now well under way, according to Vice President Charles S. Coates of Tennessee Gas Transmission Co.

The program stretches from Texas to New York, and includes the laying of 82 miles of 26-in. pipe in Ohio, 21 miles in Kentucky, and 422 miles of 30-in. in Kentucky, Ohio, Tennessee, Texas, Louisiana, Arkansas, and Mississippi. The new stations will rise in Carrollton, Ohio; Mercer, Pa., and West Winfield and Nassau, N. Y. Horsepower aggregate will be increased by 93,900, bringing total system booster power to 468,000.

Capacity of the 2000-mile Texas-to-Massachusetts system will be increased to 1310 MMcf. The entire job is to be wound up before the next heating season.

Contracts have been let to Oklahoma Contracting Co., Houston Contracting Co., Anderson Brothers, Western Pipeline Contractors, H. C. Price Co., Bechtel Corp., and Graver Construction Co.

Algonquin Wins In Court; Opponent Can Cross County

Northeastern Gas Transmission Co. and Algonquin Gas Transmission Co., the two pipeline firms which are fighting obstacles —and each other—in an attempt to complete their pipelines into New England, have both recorded some progress in recent weeks. Most of it, however, has been in the courts.

Algonquin won a 30-day stay of execution of a ruling of the Third Circuit Court of Appeals in Philadelphia, issued in early April, by appealing to the U. S. Supreme Court. The circuit court had ordered the whole question of whether one or two systems should serve New England back to FPC, on the basis that Northeastern had not had a fair hearing on its alternate proposal to serve the entire market area. The ruling, in effect, would halt construction work on the Algonquin line.

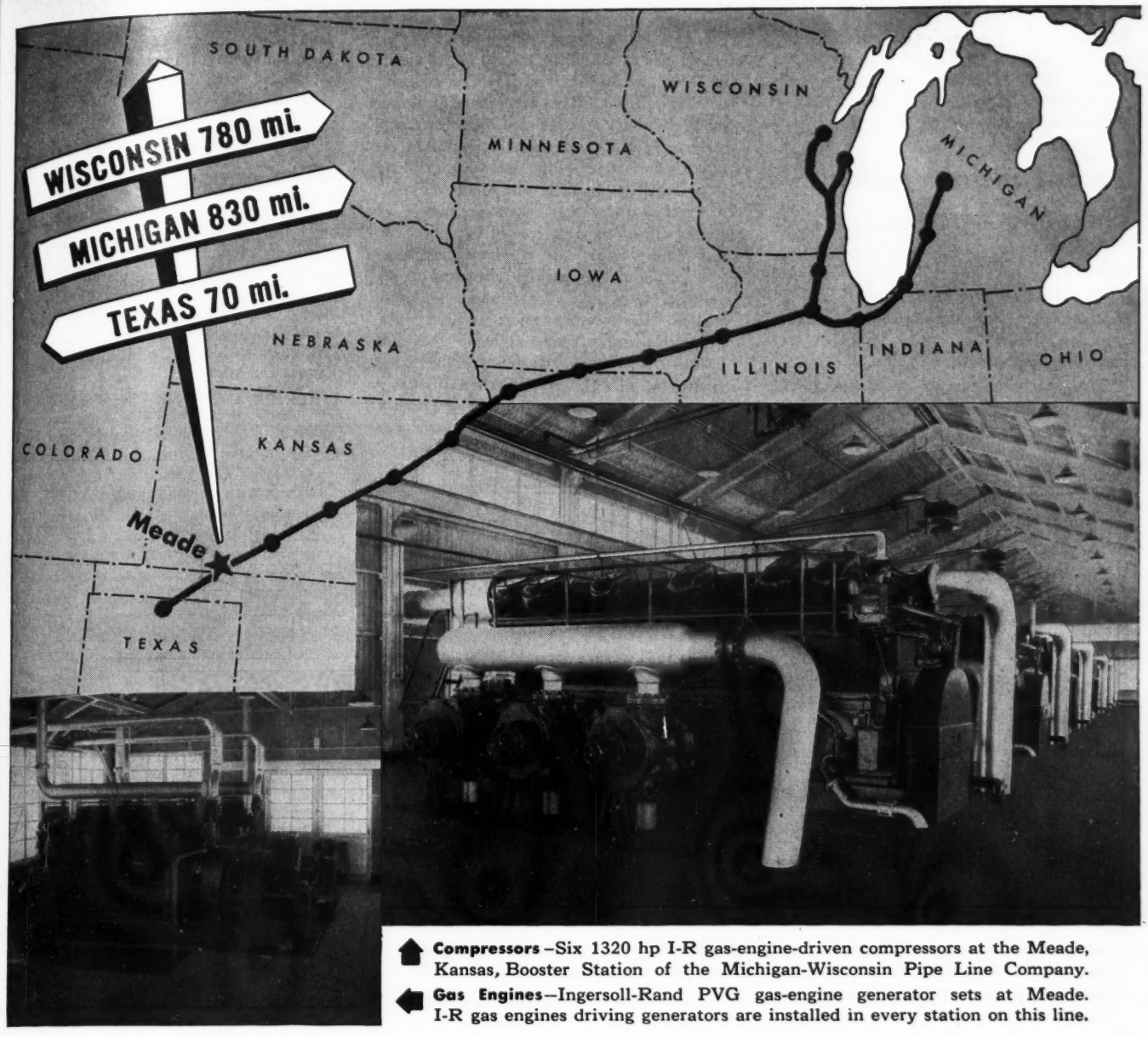
Algonquin, which told the courts it had already spent $23 million on construction, is now going ahead with the pipe laying and expects to have the line in the ground as far as East Providence, R. I., by July 15. Providence Gas Co. has been proceeding with conversion work as planned.

Northeastern, meanwhile, won a long-delayed permission to cross the property of 36 Fairfield county (Conn.) residents from the state supreme court. Since an appeal is pending before the U. S. Supreme Court, the state court warned that the line might have to be removed and damages paid.

In his ruling favoring the gas company, Judge Ernest A. Inglis pointed out that the company must proceed with the job before the high court decision is rendered lest the summer construction season pass and the company be forced to wait until the summer of 1953. Three hundred six other property owners had already granted rights-of-way.

Algonquin was having some of its own right-of-way troubles. In Swansea and Seekonk, R. I., property owners last month were

Tough luck, strong tides, and a heavy current have delayed completion of Transco crossing of "the Narrows," between Staten island and Brooklyn. Sixty-five hundred fo of 24-in. line had to be pulled beneath the 100-ft waters. A special Somastic plant w erected on Staten island to handle this job, giving the pipe a 5/8-in. coating followed by 3-in. application of Hevicote. In the photo a team of sidebooms pulls an 800-ft sectio into place.



Compressors—Six 1320 hp I-R gas-engine-driven compressors at the Meade, Kansas, Booster Station of the Michigan-Wisconsin Pipe Line Company.

Gas Engines—Ingersoll-Rand PVG gas-engine generator sets at Meade. I-R gas engines driving generators are installed in every station on this line.

BOOSTING GAS AT MEADE, KANSAS

for the Michigan-Wisconsin Pipe Line Co.

Annually, 110,000,000,000 cubic feet of natural gas pass through the 1500-mile Michigan-Wisconsin pipeline. In its long journey from Texas, the gas goes through sixteen Booster Stations before reaching millions of ultimate users in the Lake Michigan region.

Typical of these Booster Stations is the No. 1 Station at Meade, Kansas, shown above. Here the Michigan-Wisconsin Pipe Line Company has installed six 1320 hp Ingersoll-Rand KVG gas-engine-driven compressors, and two 370 hp PVG gas engines. In five other stations you will find similar Ingersoll-Rand engine and compressor installations.

The Ingersoll-Rand KVG gas-engine-driven compressor is a 4-cycle V-angle unit built in 660-, 880-, 1100- and 1360-hp. Its conservative rating and 4-cycle flexibility, its economy and reliability, make it a natural for installations wherever gas is available as a fuel.

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protesting the proposed route of the line, which would pass too close to a school and other assertedly valuable property to suit the residents. Hearings were conducted before the department of public utilities.

Texas Eastern and Delhi Enter Into Agreement

Two contract agreements—one a purchase contract and the other a "joint venture" exploration pact—have been entered into by Texas Eastern Transmission Corp., Shreveport, and Delhi Oil Corp., Dallas, it was announced last month.

The purchase contract covers an agreement whereby either Texas Eastern or its subsidiary, Texas Eastern Production Corp., would purchase Delhi natural gas properties in Duval, McMullen, and Live Oak counties of South Texas. The joint venture agreement stipulates that the two companies will allocate $1 million for development and exploration in eight south Texas fields. Texas Eastern will have the right to buy any gas discovered under this latter contract.

Texas Eastern, at a cost of $6.5 million, will obtain under the purchase agreement 8800 acres of leases which are partially developed, on which 17 producing wells are located. Recoverable reserves under the properties are estimated at more than 200 billion cu ft. Gas produced will be transported by Wilcox Trend Gathering System Inc. to Texas Eastern's mainline near Provident City, Texas. Following recovery by Texas Eastern of investment, interest, and operating costs, one-half interest will revert to Delhi.

TGT Seeks Capacity Hike For Canadian System

Tennessee Gas Transmission Co., Houston, last month filed with FPC an amended plan for relaying gas to Canada, requesting authority to build facilities to permit it to increase its system capacity 66 MMcf per day. Concurrently, Niagara Gas Transmission Ltd., Toronto, filed application for authorization to take 24 billion feet annually across the border.

Facilities to carry out the proposal include 45 miles of 20-in. (the "Niagara spur") extending from Buffalo to the boundary at Niagara Falls; 107 miles of 26- and 30-in. loop along its system; six new compressor stations with 80,500 aggregate horsepower; 50 miles of laterals; and an aerial suspension bridge across the Niagara river. For all this TGT would spend $44.7 million.

From a "presently-authorized-or-applied-for" capacity of 1,515,000,000 feet, TGT's system would be expanded to 1,581,000,000.

Niagara would buy the gas itself in Southwest producing fields and Tennessee Gas would transport it.

Expansion Program Marked By New Building

A large new unit in the Vernon industrial district of Los Angeles, housing its headquarters offices for the California area, has been opened by the Oil Well Supply Division of U. S. Steel to climax an extensive program of facilities improvement and personnel appointments in the state.

The new structure, located at 4900 South Santa Fe Ave., contains 54,000 sq ft, housing the 5600-ft office area as well as large stocks of parts and machinery. New personnel appointments at the headquarters office include R. T. Watkins, engineer; Eric Lemke, drilling equipment sales manager; and John Brown, office manager.

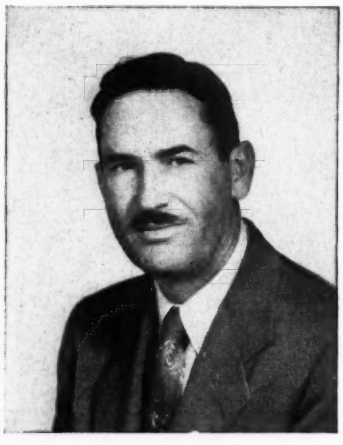
Oil Well Division has also opened a new store at Castaic, managed by James Doan, former Ventura manager, and a new Ventura building with Nelson Harpold as manager; has remodeled its Long Beach store; and has added Tom Hill and Norman Kirkland to its city sales staff in Los Angeles, Paul Paulsen at Taft, and Arne Johnson and Amos Cooke at Bakersfield.

Underground Storage Plans

United Natural Gas Co., Oil City, Pa., is currently busy dropping $1.3 million into a hole in the ground, President Howard S. Rose has announced.

This sum, for expansion and improvement of its underground storage system, is in addition to the $2.5 million spent on development of the system since 1946, and within the next few years will increase deliverability from last year's 117 MMcf per day to 155 million. To accomplish this output increase, storage capacity will be boosted from last winter's 9½ billion to an eventual 11 billion.

United Natural now has 11 storage areas with 276 wells spread over 29,000 acres.



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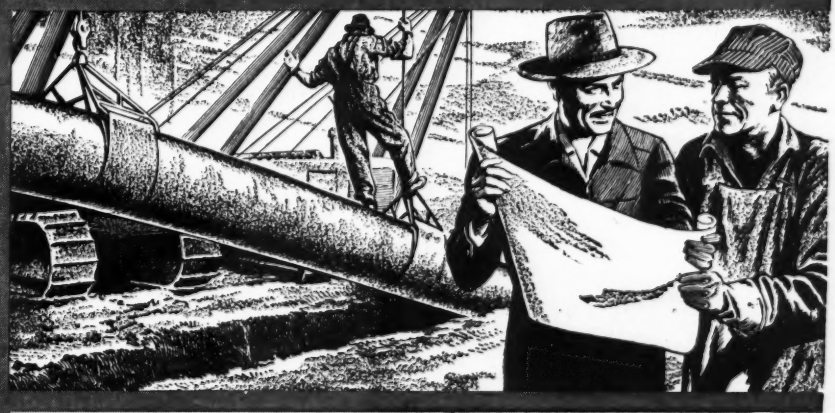

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New Texas Gathering Firm Seeks to Build System

Wilcox Trend Gathering System Inc., a new corporation of Dallas, is seeking FPC authority to construct 157 miles of main transmission pipeline, approximately 60 miles of lateral lines, and a 2200-hp compressor station.

The proposed line will carry natural gas for sale to Texas Eastern Transmission Corp., Shreveport, from various fields along the Wilcox Trend in Lavaca, Jackson, Dewitt, Victoria, Bee, Goliad, Karnes, Live Oak, McMullen, and Duval counties, Texas, to a connection with Texas Eastern's system in Lavaca county. Cost of the facilities, which would operate at a capacity of approximately 100 MMcf daily, is estimated at $10,583,156.

Wilcox and Texas Eastern have contracted for the sale and purchase of the gas, and have entered into an interim agreement whereby Texas Eastern will acquire over three-fourths of Wilcox's outstanding stock at $1.00 per share.

Amere Gas To Build

A total of 33.6 miles of line can now be built in West Virginia by Amere Gas Utilities Co., Charleston, to increase deliveries to present customers, FPC has announced.

Under FPC's authorization, Amere will spend $802,340 to build 2 miles of line to Mullens, Wyoming county; 16.5 miles in Mercer county to boost sales to Princeton and Athens, and to supply Bluefield Gas Co.; 15 miles of line in Raleigh and Mercer counties to carry gas from Atlantic Seaboard Corp.'s Flat Top compressor station to Amere's line near Beckley, W. Va.

Amere's parent, Columbia Gas System, will finance the jobs.

FPC Approves New Delivery Procedure

Arrangements for a new delivery procedure involving Southern Natural Gas Co., Birmingham, and United Gas Pipe Line Co., Shreveport, won FPC's approval last month.

United, now delivering and selling 115 MMcf per day to Southern, will reduce sales to 60 MMcf, and transport an additional 55 MMcf from Southern Production Co. to Southern Natural. United has been buying this gas from Southern Production, but now Southern Natural will purchase it direct.

United originally wanted to boost rates for gas sold to Southern Natural by $1.3 million, but during oral argument agreed to apply the old rates for gas sold and supplied.

The new arrangement will obviate the necessity for Southern Natural to build its own $4 million line from the Carthage field, as previously authorized by FPC.

NW Chicago to Get Additional Gas Supply

Permission has been granted Chicago District Pipeline Co., Joliet, Ill. to construct 12.4 miles of 30-in. pipeline in Cook county, Ill. The line will extend eastward from a connection with Texas Illinois Natural Gas Pipeline near Elgin, Ill.

The new line, to be built at an approximate cost of $1,650,000, will transport natural gas to fill the increased requirements of Public Service Co. in the northwest area of Chicago. It is estimated that between 35 and 66 MMcf per day will be delivered to Public Service.

When additional gas supplies are available, Chicago District proposes to extend the line about 13 miles eastward to provide additional service to Public Service and to Chicago District's parent company, Peoples Gas Light & Coke Co. The line will then have a capacity of about 523 MMcf per day.

Cooperative Plan Proposed

A cooperative plan sponsored by Indiana Gas & Water Co. Inc., Indianapolis, and Panhandle Eastern Pipe Line Co., Kansas City, whereby gas would be supplied to the Lebanon and Crawfordsville areas of Indiana will be heard Aug. 11, FPC has announced.

Under the terms of the agreement, Indiana Gas would build 19 miles of 8-in. and 13 miles of 6-in. line paralleling Panhandle's existing laterals from its mainline to Crawfordsville and Lebanon, respectively. Construction cost is estimated at $589,000. Panhandle would operate the lines, with Indiana Gas paying operation and maintenance costs.

Panhandle also seeks to relocate measuring and regulating stations at the two termini, selling the old facilities to Indiana Gas.

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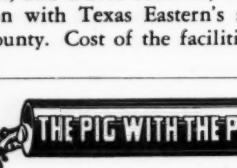

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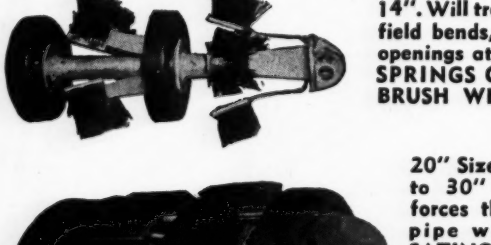
20" Size - TYPE GP-2. 16" to 30" 200-lb. SPRING forces the brushes against pipe wall — COMPENSATING for WEAR. Will traverse round opening gate or plug valves. SPRINGS and BRUSHES are identical and interchangeable for all types and sizes of GP-PIGS.



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GP-3 consists of two Type GP-1 Pigs—Each Unit may be used as individual pig.

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More Canadian Towns To Receive Gas

Construction was scheduled to begin late in June on two projects designed to bring natural gas from Brock field, Saskatchewan, to Kindersley and Brock—the fourth and fifth towns in the Canadian province to be served the fuel. To date only Lloydminster, Unity, and Kamsack are on transmission lines.

Meanwhile, plans are being formulated to take gas from the field to Saskatoon and intermediate points.

Reserves proved up to date total 40 billion ft, augmented by new discoveries in other nearby areas.

Saskatchewan Power Corp., which will carry the gas, has contracted to buy from Husky and Phillips. A 16½-mile, 4-in. line will take the gas to Kindersley, while a 3-mile, 2-in. line will serve Brock.

Lines Planned in S. C.

In an application filed with the Federal Power Commission, Carolina Natural Gas Corp. has asked permission to construct about 40 miles of natural gas pipeline to supply several South Carolina markets. The proposed line would connect with the Transcontinental Gas Pipe Line Corp. system near Kings Mountain, N.C., and extend to Rock Hill, S.C.

The $3,150,000 project would include construction of lateral lines and purchase or construction of distribution systems for York, Clover, and Fort Mill, S. C. and the Celanese Corp. of America's Celriver plant near Rock Hill. Peak day demand on the system will range from 2220 Mcf in the first year of operation to 6141 Mcf in the fifth year, Carolina Natural estimates.

Expansion Hearings Set

Mississippi River Fuel Corp.'s (St. Louis) proposal to expand its system capacity and the applications of two other companies to take some of the pipeline company's gas supplies will be heard July 14, FPC has announced.

Mississippi wants to build a new compressor station and add 17 units totaling 13,385 hp to seven existing stations in an attempt to boost system capacity to 450 MMcf per day. St. Charles (Mo.) Gas Corp. wants FPC to order Mississippi to supply it with gas through an interconnection which the company would build between Mississippi's Madison county, Ill. facilities, and the city of St. Charles. Arkansas Louisiana Gas Co., Shreveport, seeks an order directing Mississippi to supply gas for Humnoke, Ark.

New River Crossing

Texas Eastern Transmission Corp., Shreveport, last month asked the army engineers for permission to lay a fourth line across the Arkansas river a short distance from Little Rock, Ark. The line, to be buried deep in the riverbed, would replace Texas Eastern's temporary 24-in. crossing on the Rock Island railroad bridge nearby.

Two years ago, the company unsuccessfully attempted to lay a similar line, but it parted during a flood and repair efforts proved fruitless.

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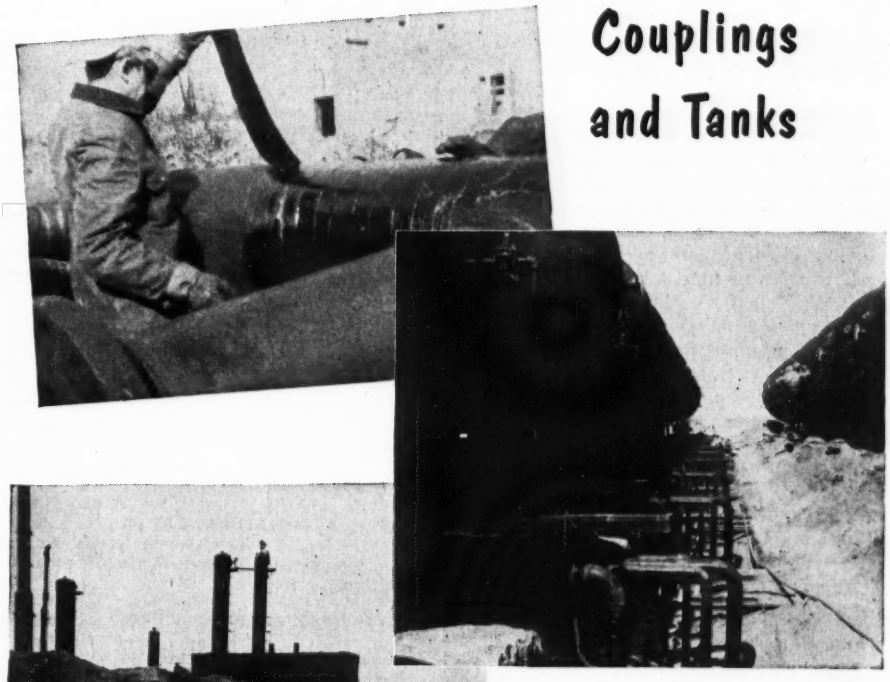

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PAD Aid Given

Third-quarter priorities assistance to six major gas pipeline projects with a total estimated construction cost of $215,898,000, as well as several hundred smaller jobs, has been given by PAD. The six projects were allocated 169,600 tons of 16-in. and larger pipe, while the smaller plans were given a total of 214,800 tons.

PAD has also revealed that as of the end of the first quarter of 1952, assistance had been rendered 1747 gas cases involving expenditures of $1,349,614,996. Lumping all oil and gas projects, 3575 jobs totaling $3.5 billion had been approved.

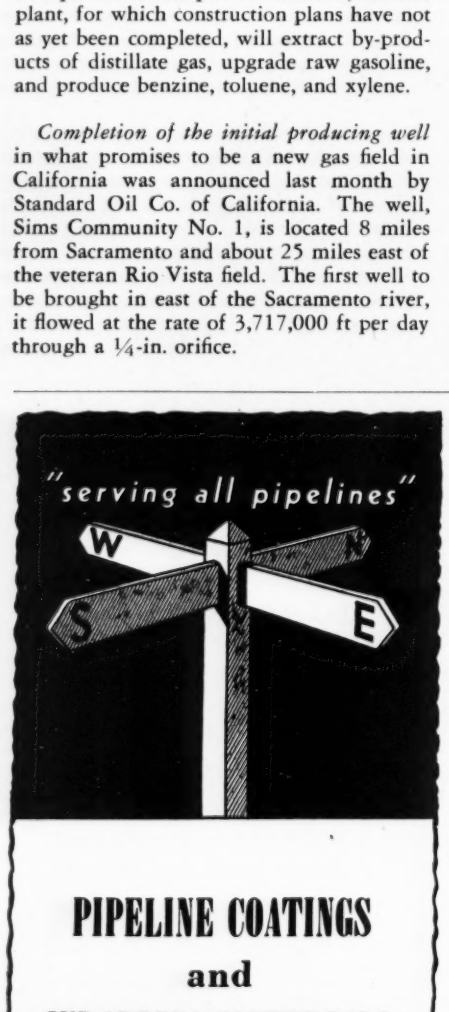
Pipeline Newsnotes

Southwest Gas Producing Co. and the Feazel interests have been granted a federal certificate of necessity to construct a $4 million petrochemical plant at Dubach, La. The plant, for which construction plans have not as yet been completed, will extract by-products of distillate gas, upgrade raw gasoline, and produce benzine, toluene, and xylene.

Completion of the initial producing well in what promises to be a new gas field in California was announced last month by Standard Oil Co. of California. The well, Sims Community No. 1, is located 8 miles from Sacramento and about 25 miles east of the veteran Rio Vista field. The first well to be brought in east of the Sacramento river, it flowed at the rate of 3,717,000 ft per day through a ¼-in. orifice.

Ohio Fuel Gas Co., Columbus, is under way on a $1 million construction program to increase deliveries in its 57-county system. The four-part plan includes a 14-mile line between Carroll and Columbus, the final section of a 47-mile mainline to bring gas from Hocking county storage fields; two miles of line connecting two Columbus stations; and installation of new regulating, measuring, and cleaning facilities.

An invasion of 250 men broke up a pipeline laying operation near Vanceburg, Ky. last month, wrecking heavy equipment and injuring about a dozen pipeliners. Damages to equipment were estimated at $25,000 as several trucks were pushed over an embankment and bulldozers and tractors were wrecked, but personal injuries were reportedly minor. The invaders, assertedly union men attempting to persuade the pipeliners to organize, disappeared before police arrived.



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PROGRESS REPORTS

Planned

ARKANSAS-MISSOURI POWER CO., Blytheville. Docket G-1900 for a line from Campbell, Mo., to Blytheville, Ark., and a line from a point just west of the St. Francis river in Clay county, Ark., to Rector, Ark. The total of 140 miles of pipeline is to serve 13 communities in Arkansas and 5 in Missouri.

ASSOCIATED NATURAL GAS CO., Tulsa. Docket G-1929 for 32 miles of line for service to Jackson, Portageville, Gideon, Morley, Spoonerville, and Bernie, Mo.

ATLANTIC SEABOARD CORP., Charleston. Docket G-1850 for two new compressor stations aggregating 7640 hp, with 3080 hp addition to be installed in existing station, all in West Virginia.

CAROLINA NATURAL GAS CORP., Charlotte, N. C. Docket G-1956 for 40 miles of line to connect with Transco line near Kings Mountain, N. C., extending to Rock Hill, S. C., with laterals to four South Carolina points.

CENTRAL KENTUCKY NATURAL GAS CO., Charleston. Docket G-1905 for 8.8 miles of 20-in. pipeline to parallel an existing section from North Means, Ky., to Cincinnati.

CENTRAL WEST UTILITY CO., Kansas City, Docket G-1682, four alternate plans to serve Clay county, Mo.

EAST TENNESSEE NATURAL GAS CO., Knoxville. Docket G-1336 for a 100-mile, 16-in. line from near Knoxville to Kingsport, Tenn. with appurtenant equipment.

EL PASO NATURAL GAS CO. Docket G-1631 for 112.9 miles 30-in., 179.5 miles field lines, 98,200 hp added capacity plus 36,540 hp in field stations, field gathering systems, and miscellaneous facilities; 133.3 miles main line loop; 14,800 additional compressor hp in existing stations; 105,000 hp in new and authorized main line booster stations; new field lines and field compressor stations and additions; purification and dehydration plants; field gathering systems; amine recovery plants; and other miscellaneous facilities.

EL PASO NATURAL GAS CO. Docket G-1630 for 25,050 hp at new and existing stations, 50.9 miles field lines, 2700 hp at a field plant, gas wells and miscellaneous facilities; 36.9 miles of main line loop; 32,560 miles in main line compressor hp; field transmission lines, compressor stations and gathering system; dehydration plants; a gasoline absorption plant; gas wells; and communication facilities.

GLACIER GAS CO., Butte, Mont. Dockets G-1816, G-1817, G-1818 for 285 miles of 20-in. from northeast of Kalispell, Mont. to Spokane, Wash.; 91 miles of 8⅝-in. from Spokane to Lewiston, Idaho; 120 miles of 16-in. from Spokane to Hanford, Wash.; 130 miles of 12¾-in. from Spokane to south of Trail, B. C.

HOME GAS CO., Pittsburgh. Docket G-1893 for 32.5 miles of line in Chemung and Broom Counties, N. Y.

HOPE NATURAL GAS CO., Clarksburg. Docket G-1946 for 33 miles of various size line to connect with present line in Wyoming county, W. Va., and extend into Buchanan county, Va.

INDIANA GAS & WATER CO. INC., Indianapolis. Dockets G-1813 and G-1937, for 19 miles of 8-in. paralleling Panhandle Eastern Pipe Line's lateral between Panhandle mainline and Crawfordsville; 13 miles of 6-in. paralleling Panhandle lateral from its mainline to Lebanon; both lines to be operated by Panhandle.

KANSAS NEBRASKA NATURAL GAS CO., Hastings. Docket G-1857. To build 179 miles of line in Kansas and Nebraska and rearrange certain compressors, stub lines and metering stations to serve new main line industrial customers.

MANUFACTURERS LIGHT & HEAT CO., Pittsburgh, Pa. Docket G-1893 for 40 miles of pipeline in Allegheny, Washington, and Beaver counties, Pa., and Belmont, Jefferson, and Columbiana counties, Ohio.

MIDSOUTH GAS CO., Little Rock, Ark. Dockets G-1445 and 1680 for 240 miles of line in Greene, Crittenden, St. Francis, Lee, Phillips, Monroe, Woodruff, Poinsett, and Cross counties, Ark.

MISSISSIPPI RIVER FUEL CORP., St. Louis. Docket G-1932 for construction of 17 compressor units, totaling 13,385 hp, in 7 existing stations in Arkansas and Missouri, and one new station in Missouri.

MISSOURI CENTRAL NATURAL GAS CO., Macon, Mo. Docket G-1509 for 25 miles of 6-in. from Moberly to Macon, Mo.

MONTANA-DAKOTA UTILITIES CO., Minneapolis. Docket No. G-1933 for a 2640-hp compressor station in Butte county, S. D.

MORGANFIELD NATURAL GAS CO., Morganfield, Ky. Docket G-1935 for a 31-mile, 4- and 6-in. line lateral to proposed Texas Gas Transmission Corp. line, to serve 6 Kentucky communities.

NATURAL GAS STORAGE CO. OF ILLINOIS, Chicago. To build facilities to develop an underground storage area 15 miles from Kankakee, Ill.

NEVADA NATURAL GAS PIPE LINE CO., Las Vegas. Docket No. G-1888 for 114 miles of 10¾-in. line from Topock, Ariz., to Las Vegas area, Henderson, and Boulder City.

NORTHERN NATURAL GAS CO., Omaha. Docket G-1918 for 400 miles of 24-in. pipe from the United States-Canadian border to a point near Minneapolis and two compressor stations with 5280 hp each.

NORTHWEST NATURAL GAS CO. Docket G-99 for 645 miles of 18-, 20-, 22-, and 24-in. line in Washington, Idaho and Oregon together with laterals and four compressor stations aggregating 24,750 hp.

OHIO FUEL GAS CO., Columbus. Docket G-19 for 33 miles of 20-in. to replace 42 miles of existing 8⅝- and 10¾-in. pipe in Crawford, Wyandot, and Seneca counties, Ohio.

PACIFIC GAS & ELECTRIC CO., San Francisco. Docket G-1651 for 86.25 miles 34-in. loop and 19,540 hp at authorized stations.

PACIFIC GAS & ELECTRIC CO., San Francisco. Docket G-1892 for 20 miles of 16-in. line from Burrell to a point near Easton and 15 miles of 20-in. pipe extending from Helm and joining the system's Topock-Milpitas line in Fresno county; and for 15.5 miles of 12¾-in. in Madera county parallel to the existing Madera-Livingston line.

PACIFIC NORTHWEST PIPELINE CORP., Houston. Dockets G-1429, G-1908, and G-1909 for 828 miles of line to serve Portland, Ore., and Spokane, Seattle, and Tacoma, Wash.

PERMIAN BASIN PIPELINE CO., Chicago. Docket G-1928 for a 384-mile line from Upton county, Texas, through Lea county, N. M., north to Roosevelt county, N. M., and northeast to Carson county, Texas, connecting with facilities of Northern Natural Gas Co.

PIEDMONT GAS CO. INC., Hickory, N. C. Docket G-1617 for 28 miles 6-in. line.

ROCKLAND LIGHT & POWER CO., Nyack, N. Y. Docket G-1728 for 22 miles transmission line between Orangetown and Tomkins Cove, N. Y. Postponed indefinitely.

SOUTH GEORGIA NATURAL GAS CO., Birmingham. Docket G-1915 for a 339-mile line to serve communities in southwest Georgia and northern Florida. Main trunk would connect with system of Southern Natural Gas Co. in Lee county, Ala., and extend to Albany, Ga., with a branch to Tallahassee, Fla.

SOUTHERN CALIFORNIA GAS CO. and **SOUTHERN COUNTIES GAS CO.,** Los Angeles. Docket G-1718 for 14 miles 30-in. line between Whitewater and Desert Center, Calif., 6 miles 30-in. from Blythe, Calif. station to Calif.-Ariz. border, two 1760-hp compressors at Blythe, one 5000-hp gas turbine compressor station at Desert Center, and one 5000-hp gas turbine compressor station at Cactus City.

SOUTHERN NATURAL GAS CO., Birmingham. Dockets G-1676 and G-1907 for 1254.7 miles of various size pipelines and seven compressor stations totaling 33,300 hp in Alabama, Georgia, Mississippi, Louisiana, and South Carolina.

TENNESSEE GAS TRANSMISSION CO., Houston. Dockets G-1921 and G-1922 for a presidential permit to construct and operate facilities at the International Boundary north of Niagara Falls and for FPC certificate for 45 miles of 20-in. from Buffalo to Niagara; 107 miles of 26- and 30-in. loop on mainline; six new compressor stations with 80,500 hp; 51,500 hp in old stations; 50 miles of laterals; aerial suspension bridge over Niagara river.

TENNESSEE GAS TRANSMISSION CO., Houston. Docket G-1930 for a 2640-hp compressor station in Carthage field, Panola county, Texas.

TEXAS EASTERN TRANSMISSION CO., Shreveport. Docket G-1947 for 315 miles of 24-in. line from a point in Lavaca county, Texas to Castor, La. with a 5500-hp compressor station in Shelby county, Texas.

TEXAS GAS TRANSMISSION CORP., Owensboro. Docket G-1847 for 407 miles 26-in. loop line on sections of existing line between Bastrop, La. and Hardinsburg, Ky. together with installation of 14,620 hp.

TEXAS-OHIO GAS CO., Houston. Docket G-1810 for 1439 miles of 30-in. from Hidalgo county, Texas, through Arkansas, Mississippi, Tennessee, Kentucky, Ohio, and terminating near Spencer, W. Va., including 14 compressor stations totaling 135,000 hp.

TRANS-CANADA PIPE LINES LTD., for 2200-mile line from Alberta to major cities as far east as Montreal.

UNITED FUEL GAS CO., Charleston, W. Va. Docket G-1952 for 21.5 miles of gas pipeline, one 880-hp compressor station and addition of 3960 hp to an existing station.

UNITED GAS PIPE LINE CO., Shreveport. Docket G-1879 for compressor stations at Napoleonville and Jackson, Miss., for 13,280 total hp; and an addition of 8,000 hp at authorized stations near Montpelier, La., and in Walthall county, Miss.

UNITED GAS PIPE LINE CO., Shreveport. Docket G-1951 for 31 miles of 20-in. line from an offshore gas field in the Gulf of Mexico to connect with line under construction in Terrebonne Parish, La.

UNITED NATURAL GAS CO., Oil City, Pa.

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The H. C. Price Co.'s success in reducing its accident frequency rate from 158.4 per million man hours in 1948 to 43.7 last year brought the contracting company recognition in the form of the certificate of honor of the Joseph A. Holmes Safety Assn. Presenting the award to Mr. Price (second from left) is A. A. Munsch, safety representative of the Bureau of Mines, which sponsors the association. Bennie G. Pierce, Price safety director (left), and John M. Thomas, vice president of the company's pipeline division, watch the ceremony.

Docket G-1854. To build 15.1 miles 12-in. line and replace 6.5 miles 8-in. line in Venango county, Pa., and to build 12.4 miles 6-in. line and replace 2.7 miles of 3-in. line in Warren county, Pa.

UTAH NATURAL GAS CO. to build a 360-mile line from the San Juan basin to Salt Lake City. A secondary line would run from Last Chance field (Wayne county, Utah) through Sevier and Sanpete counties.

WESTCOAST TRANSMISSION CO. INC., Wilmington, Del., 349 miles, including 277 miles from Sumas, Wash. to Portland, Ore. with short branches to a number of cities in the two states; and 72 miles of laterals and 13 measuring stations.

WESTERN SLOPE GAS CO., Denver. 49 miles of main transmission line and 30 miles of gathering lines to bring natural gas to Grand Junction from the Douglas Creek field, Rio Blanco county; Germesa field, Garfield county; and Highline Canal and Asbury Creek fields in Mesa county.

WILCOX TREND GATHERING SYSTEM INC., Dallas. Docket G-1959 for 217 miles of line and one 2200-hp compressor station in Lavaca, Jackson, Dewitt, Victoria, Bee, Goliad, Karnes, Live Oak, McMullen, and Duval counties, Texas.

Under Way

ALGONQUIN GAS TRANSMISSION CO., Boston, facilities to serve designated companies in Mass., R. I., Conn., and N. J. Includes 253 miles of main line and 279 miles of laterals.

CITIES SERVICE GAS CO., Oklahoma City, has Engineering Construction Co. at work on 68 miles 4- to 16-in. in vicinity of Liberal and Ulysses, Kan.

CITIES SERVICE PIPE LINE CO. Gragg Construction Co. to build 20-mile, 8-in. line from Coyle to Cushing, Okla.

MANUFACTURERS LIGHT & HEAT CO., Pittsburgh, has H. L. Gentry at work laying 20 miles of 8- and 10-in. line from Sebring, Ohio, to Dunnagan.

MICHIGAN GAS STORAGE CO., Jackson, laying 41 miles 24-in., Rose Center to Laingsburg. Mahoney Contracting Co. to complete in July.

MICHIGAN GAS UTILITIES CO., Coldwater, Mich., has Somerville Construction Co. at work on a 4-in. line extending 9 miles from the Panhandle Eastern Line to Dundee, Mich.

NATURAL GAS PIPELINE CO. OF AMERICA, Chicago, has Midwestern Constructors at work on station alterations at 107, Emerson, Iowa, and 108, Truro, Iowa. 10% complete.

NEW YORK STATE NATURAL GAS CORP., Pittsburgh. Docket G-1824 for 104.7 miles of line in Pennsylvania and New York and installation of an additional 2420 hp at two existing compressor stations in Westmoreland and Tioga counties, Pa. Williams-Austin Co. is at work on

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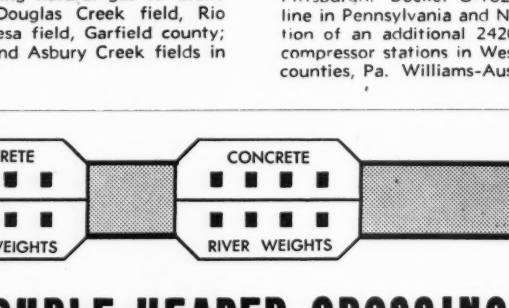

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52 miles of 16-in. line from Utica to Amsterdam, N. Y.; 20 miles of 20-in. from Cayuta Gate to Ithaca, N. Y.

NEW YORK STATE NATURAL GAS CORP., Pittsburgh, Pipe Line Construction & Drilling Co. for 23½ miles of 16- and 20-in. line from Preston station near Waynesburg, Pa. to Colvin Gate, Washington county, Pa.

NORTHEASTERN GAS TRANSMISSION CO., Springfield, Mass. 1952 construction plans include 100 miles 16-in. from Greenwich, Conn. to Springfield, Mass.; 23 miles 4-in. from Granville, Mass. to Torrington, Conn.; 26 miles 6-in. from Framingham to Fitchburg, Mass.; 45 miles of 8-, and 4-in. from Lowell, Mass. to Concord, N. H. and 15 meter stations.

PACIFIC GAS & ELECTRIC CO., San Francisco. Docket G-1709 for a 44-mile, 8⅝-in. line in Monterey county, Calif. Scheduled for completion Aug. 15, 1952.

TEXAS EASTERN TRANSMISSION CORP., Shreveport. Line as far north as Ohio river now in operation. Anderson Bros. at work on 217 miles of 30-in. line from Ohio river crossing near Wheelersburg, Ohio, to Station 21 near Connellsville, Pa., expected to be completed this summer.

UNITED GAS PIPE LINE CO., Shreveport. Gulf Southern Contractors at work on 1017 miles of 6- to 30-in. line in Texas, Louisiana, and Mississippi and offshore in the Gulf of Mexico; Brown and Root at work on 9 compressor stations and 10 dehydration plants in the above states; Pittsburgh-Des Moines Steel Co. at work on suspension crossings over Brazos, and Red rivers; Massey Pipe Line Construction Co. is laying 16 miles of 20-in. near San Antonio. Also 24 miles of gathering lines and measuring facilities to connect the Agua Dulce field with a plant in Nueces county, Texas.

Pending Construction

IOWA-ILLINOIS GAS & ELECTRIC CO., Davenport. Docket G-1721 for a 41-mile, 10-in. line from Washington county to Cedar Rapids, Iowa. Construction to begin third quarter of 1952.

LAKE SHORE PIPE LINE CO., Cleveland, Ohio, 45-mile, 10¾-in. line from Meadville, Pa. to Ashtabula, Ohio. Contract let, right-of-way secured, ready to start construction. Work delayed by strike.

NEW YORK STATE NATURAL GAS CORP., Pittsburgh. 20-mile, 16-in. line from Leidy compressor station to Driftwood, Pa.; 23-mile, 20-in. line from Tonkin station to Valley Gate, Pa.; 13-mile, 14-in. line from Aurelius to Skaneateles, N. Y.

SALEM, CITY OF, ILL. Modern Welding Co. will begin construction of a 13½-mile, 4-in. main transmission line as soon as balance of pipe received. Scheduled to begin late last month.

TENNESSEE GAS TRANSMISSION CO., Houston, 521 miles of looping along present system; 420 miles, 30-in., Texas, Louisiana, Arkansas, Mississippi, Tennessee, and Kentucky, and 101 miles 26-in., Kentucky and Ohio. Houston Contracting just starting work on 43 miles of 30-in., Mississippi river to Gallion, La.; 45 miles of 30-in., Eros, La. to Coldwater, La.; 39 miles 30-in., Sabine river to Jasper, Texas. Oklahoma Contracting Co. is building three sections in Texas: 20 miles, Refugio to northeast; 50 miles, East Bernard to Cypress; 47 miles, Cleveland to Woodville. Anderson Brothers: 33 miles from Greenville, Miss. to near Drew; 37 miles from Holly Springs, Miss. to near Mississippi-Tennessee line; 37 miles from Selmer, Tenn. to Parsons. Western Pipeline Constructors: 32 miles, White Bluff, Tenn. to near Springfield; 27 miles, Greensburg to Lebanon, Ky. H. C. Price: 59 miles from Oak Hill to Glouster, Ohio; 24 miles from Uhrichsville to Carrollton, Ohio. Station enlargements at Agua Dulce, Victoria, East Bernard, and Jasper, Texas; Natchitoches and West Monroe, La.; Greenville and Batesville, Miss.; Lobelville and Portland, Tenn.; Campbellsville, Greenup, Winchester, Ky.; Albany and Cambridge, Ohio. New stations: Carrollton, Ohio; Mercer, Pa.; West Winfield and Nassau, N. Y.

UNITED GAS PIPE LINE CO., Shreveport. Docket G-1880 to build 36 mile line from a point near Ingleside, Tex., for connection with system near Refugio, Tex.

Approved

AMERE GAS UTILITIES CO., Charleston, W. Va. Docket G-1716, for 33.6 miles of West Virginia line: 2 miles in Wyoming county to supply Mullens; 16.5 miles in Mercer county to supply Princeton, Athens, Bluefield Gas Co.; 15 miles in Raleigh and Mercer counties to bring gas to system from Atlantic Seaboard's Flat Top compressor station.

CHICAGO DISTRICT PIPELINE CO., Joliet, Ill. Docket G-1756 to build 12.4-mile, 30-in. line in Cook county, Ill.

COLORADO-WYOMING GAS CO., Denver. Docket G-1821 for 2 mile, 3-in. line from Johnstown to Milliken; and 4 mile, 6-in. line to Rocky Flats Plant of the Atomic Energy Commission.

TENNESSEE GAS TRANSMISSION CO., Houston. Dockets G-1573 and G-1614 for 591 miles of line parallel to existing system, a 304 mile line from near Mercer, Pa. to Utica, N. Y. with a total of 165,000 hp to be installed at new and existing compressor stations. Also 250 miles of miscellaneous lines.

Contracts Let

NIAGARA MOHAWK POWER CORP., Syracuse, to H. L. Gentry, for 22 miles of 10-in. through 24-in. line in the vicinity of North Syracuse. Work under way June 9.

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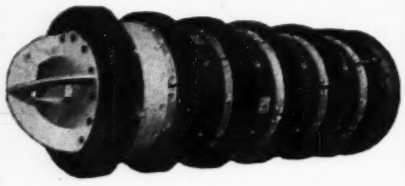

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PIPELINE PEOPLE

H. G. Horstman

H. G. HORSTMAN has been appointed assistant to the president of Texas Gas Transmission Corp., Owensboro, Ky. Mr. Horstman has been with the company since May 1950 as director of sales and customer relations. Prior to joining Texas Gas he was personnel director of Public Service Co. of Indiana and had served in that company's operations department as assistant to the vice president and as gas and water distribution engineer. He entered the utility field as a cadet engineer with Northern Indiana Gas & Electric Co.

Promotion of three West Coast men has been announced by Worthington Corp. J. P. MCARTHUR, was appointed manager of the company's Philadelphia district sales office. H. W. KING replaced Mr. McArthur as regional manager of West Coast sales, and former resident salesman of Portland, Ore., P. L. MCMANUS moves up to manager of the San Francisco district office, replacing Mr. King.

With Worthington since 1936, Mr. McArthur has been regional manager of West Coast sales since 1949. Mr. King joined Worthington in 1923 as general line salesman and has been manager of the San Francisco district office since 1949. Mr. McManus has been with Worthington intermittently since 1936, with time out for military service.

C. C. Reiff

Bernard Last

CHARLES C. REIFF has been named chief engineer of Rockwell Manufacturing Co.'s Barberton (Ohio) division. BERNARD LAST succeeds him as project engineer of the lubrication department with headquarters in the company's home office in Pittsburgh.

Mr. Reiff, design engineer for Rockwell since 1950, will be responsible for the engineering and manufacturing of Nordstrom valves. Mr. Last, in his new position, will develop lubricating equipment for Nordstrom valve lubricants.

Newly appointed supply contract representative for Texas Gas Transmission Corp., Owensboro, Ky., is FRANKLIN K. RADER.

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